Flow

THE MAGAZINE WHICH INTEGRATES MATERIAL HANDLING EQUIPMENT INTO THE FLOW OF PRODUCTION

NOVEMBER
1945

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EFFICIENT HANDLING OF MATERIALS SPEEDS PRODUCTION FLOW

Economies

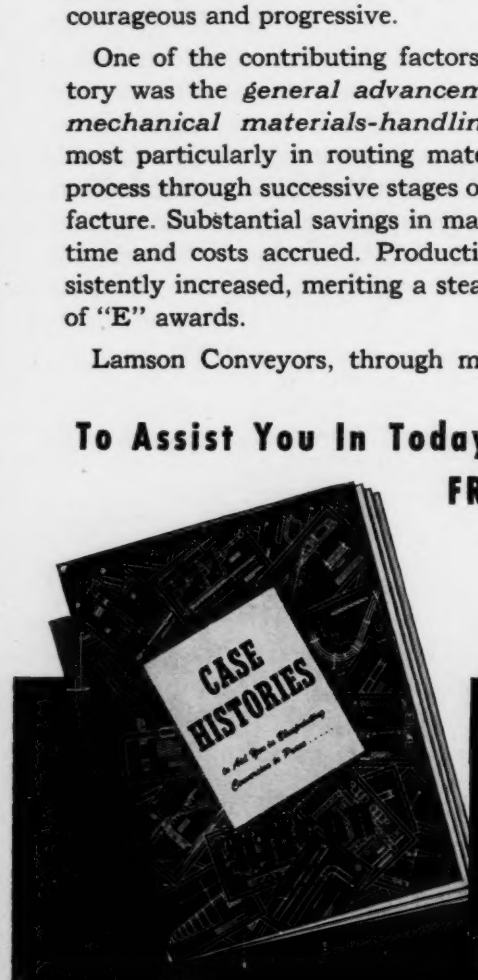
● Fearful of being "too late with too little," American industry won its race against time. Quantity and quality surpassed the hopes of all but the most courageous and progressive.

One of the contributing factors to victory was the *general advancement in mechanical materials-handling,* and most particularly in routing materials in process through successive stages of manufacture. Substantial savings in manpower, time and costs accrued. Production consistently increased, meriting a steady flow of "E" awards.

Lamson Conveyors, through many ingenious applications, devised by Lamson engineers, showed industry throughout the length and breadth of the country, new speeds and economies in materials-handling.

The rewards of Lamson achievement are now available to you . . . and in practice are essential to the competition which is following reconversion.

To Assist You In Today's Planning, We'd Like To Send The FREE BOOK "CASE HISTORIES" . . .

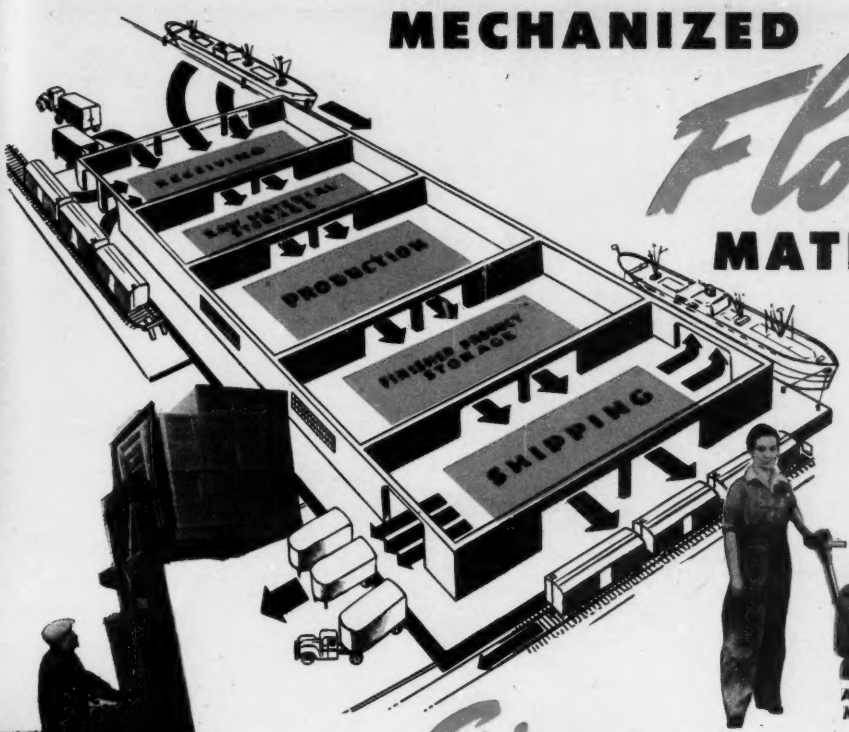


It will aid you in blueprinting conversion to peacetime conditions . . . come inside some of America's greatest industries with us . . . and see how they will handle the problems of increased output at lower costs. Write for your copy today.

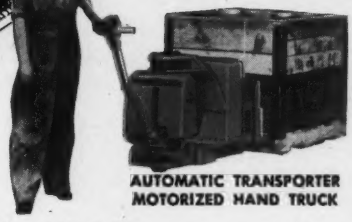
LAMSON CORPORATION
1300 Lamson St., Syracuse 1, N. Y.
Please send me a copy of your reconversion booklet, "Case Histories."

Name..... Position.....
Company.....
Address.....
City and Zone..... State.....

MECHANIZED *Flow* OF MATERIALS



AUTOMATIC FORK TRUCK



AUTOMATIC TRANSPORTER MOTORIZED HAND TRUCK

Gives you

LOWER UNIT COSTS . . .

Management is now *compelled by competition* to utilize men, methods, materials and machines in a manner *to achieve lowest production cost and sales price per unit.*

While processing motions usually add value to a product, *handling motions add only to its cost.*

You can lower your unit costs if you will team up AUTOMATIC's battery-powered Fork Truck with the war-tested "TRANSPORTER," AUTOMATIC's *service-proved,* motorized hand truck,—and apply AUTOMATIC's Engineered Materials Handling Methods.

AUTOMATIC's completely Engineered Materials Handling Service will do these things for you:

1. *Eliminate* costly manual handling.
2. *Reduce damage* to materials handled.
3. *Increase storage capacity* by safe, vertical stacking of materials to rooftop.
4. *Simplify inventory* control.
5. *Increase productivity* by reducing labor fatigue.
6. *Reduce accidents.*

Please write us now so we may schedule your plant for the next AUTOMATIC Engineered Materials Handling survey in your area.

Fre[illegible]ervice

AUTOMATIC has 100 Materials Handling Engineers in the field. There's one near your plant. He is ready to help you analyze your operations from receipt of raw materials through each successive handling procedure to storage and final shipment.

***Please write us now* so we may schedule your plant for the next AUTOMATIC Engineered Materials Handling survey in your area.**

MANUFACTURERS OF *Electric* INDUSTRIAL TRUCKS SINCE 1906

AUTOMATIC TRANSPORTATION COMPANY

Division of the Yale & Towne Manufacturing Company

141 West 87th Street Chicago 20, Ill. U.S.A.

Specialists in developing **ENGINEERED MATERIALS HANDLING TO LOWER UNIT COSTS**

KATHANODE
BATTERIES
Cut Charging Costs in...

ELECTRIC TRUCK OPERATION

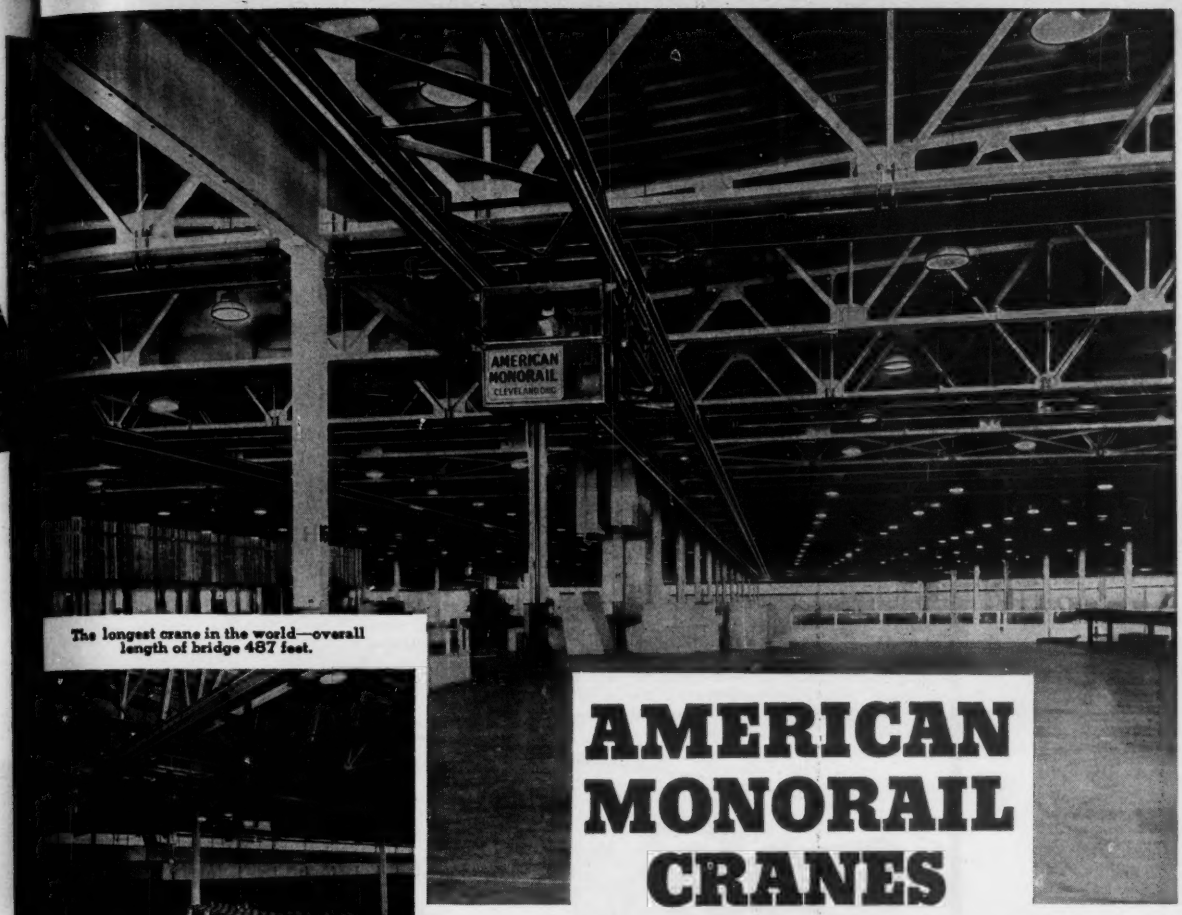
GOULD

PIONEER OF GLASSKLAD CONSTRUCTION

Kathanode's high charging efficiency is due to its special negative plate. This has a negative active material of unusually high density. It is less inclined to permanent sulfation and therefore requires less current in the conversion from sponge lead to lead sulphate.

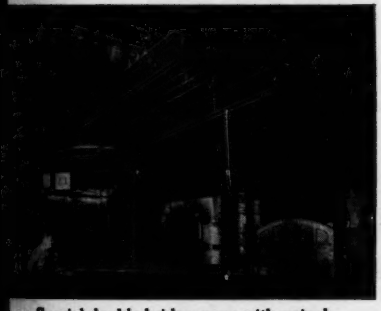
In battery-powered electric trucks this more efficient utilization of charged current means lower charging costs and better operation of your materials handling equipment.

Battery power is best for materials handling, and Kathanode is the best battery power. Write Dept. 1811 for Catalog 101 on Gould Kathanode Glassklad Batteries for Industrial Truck and Tractor Service.

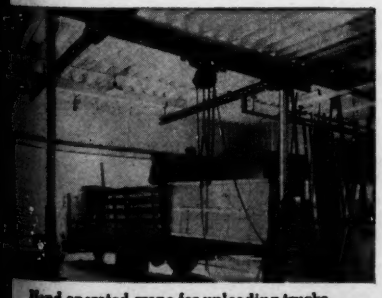


The longest crane in the world—overall length of bridge 487 feet.

Cab control permits high piling and accurate spotting of heavy, bulky loads.



Special double bridge crane with swivel truck allows quick handling at furnace.



Hand operated crane for unloading trucks.

AMERICAN MONORAIL CRANES

WILL SERVICE EVERY SQUARE FOOT OF YOUR OPERATING SPACE

American MonoRail Cranes supply overall coverage . . . your handling is not tied down to alleyways or spotting and unloading near permanent equipment.

American MonoRail Cranes are available for any type of job—heavy or light duty—full automatic—cab control or hand operated. They can be installed under present operating conditions without excessive structural changes.

Consult with the American MonoRail engineer, he will gladly explain this extremely easy method of handling—the low cost of installation and operation.

THE AMERICAN MONORAIL COMPANY

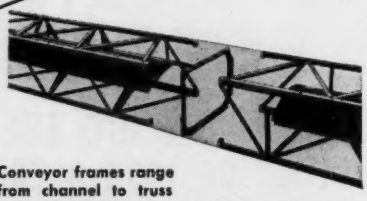
13129 ATHENS AVE. ● CLEVELAND 7, OHIO

How 4-WAY B G Engineering

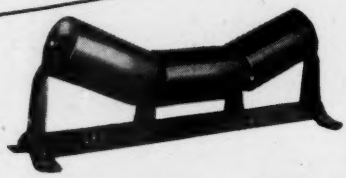
PROVIDES THE PROPER COMBINATION FOR PEAK CONVEYING EFFICIENCY

Terminals are factory assembled as units, ready for belting to conveyor frame. Field assembly of miscellaneous pulleys, bearings, and other parts, is completely eliminated. Barber-Greene terminals are available in a wide range of types, sizes, and horsepower.

This take-up unit, for instance, is standardized in the same manner as the head-end drive. B-G *pre-engineered* equipment is used in some of the longest conveying systems in the world — for processing, storing and reclaiming.



Conveyor frames range from channel to truss type, in depths to meet span requirements. Lengthening a conveyor is merely a matter of adding *standardized* sections. Conveyor system is easily revamped — terminal units attach directly to any section.



Carriers and return rollers are properly designed to furnish maximum strength with minimum weight. All steel, jig-welded construction insures correct alignment. Choice of troughing, flat, self-aligning, or rubber impact carriers—with roller, ball or plain bearings.

1. **PRE-ENGINEERING** by Barber-Greene assures selection of the right equipment for your particular job.

2. **PRE-FABRICATION** of conveyor units saves erection time — guarantees correct assembly and belt alignment.

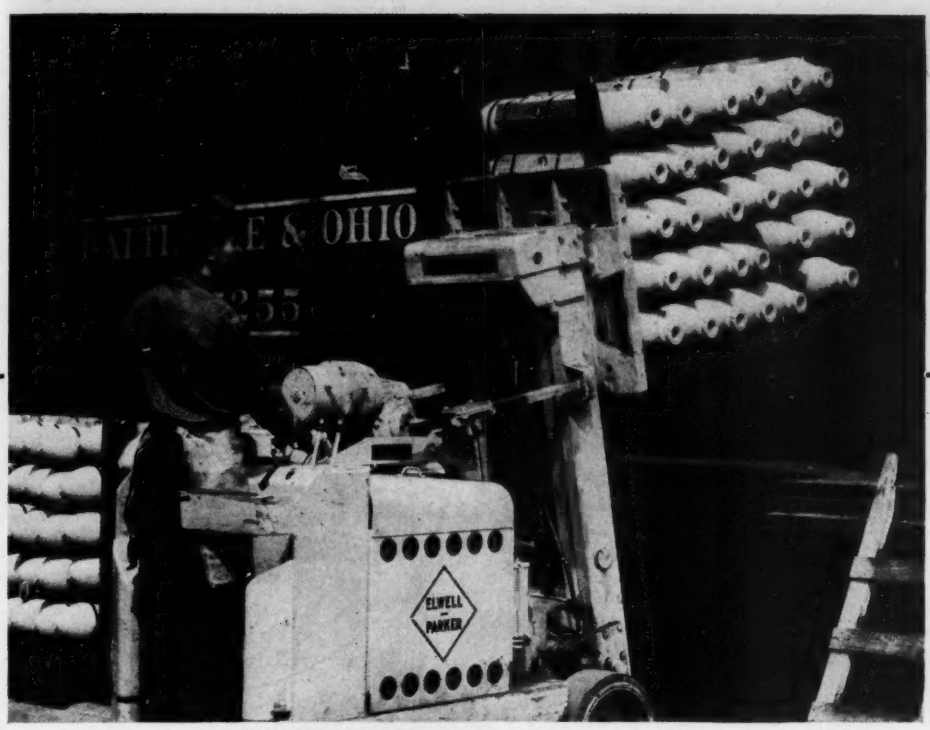
3. **STANDARDIZATION** permits interchangeability — makes installation, alterations and moving speedier.

4. **VARIETY OF EQUIPMENT** gives you the choice of sizes and types that best meet your requirements.

When you have a material handling problem, call in B-G engineers to help you. Barber-Greene Company, Aurora, Illinois.

Barber-Greene B G *Constant Flow Equipment*

XUM



A fine example of "palletizing", showing heavy merchandise being quickly and efficiently loaded by one operator of Enamel Products Co., Cleveland, Ohio.

Multi-Profits FROM PALLETIZING

With box-car and storage tonnage at an all-time peak, heavy merchandise must be packed, put aboard or stored as quickly as possible.

The most efficient and proven way to cut labor costs and help speed up this tonnage is through the use of pallets. Merchandise can be stacked to the roof if necessary. Bound securely with Stanley Steel Strapping, the goods can be handled by one operator in a fraction of the time formerly employed by two or more men... *and safely!*

With pallets, practically any company with large-volume output, can:

- ★ **SAVE LABOR**
- ★ **SAVE SPACE**
- ★ **REDUCE ACCIDENTS**
- ★ **CUT FATIGUE**
- ★ **SAFEGUARD MATERIALS**
- ★ **ELIMINATE COSTLY CONTAINERS**

The Stanley Works, Steel Strapping Division,
New Britain, Connecticut

STANLEY

Trade Mark

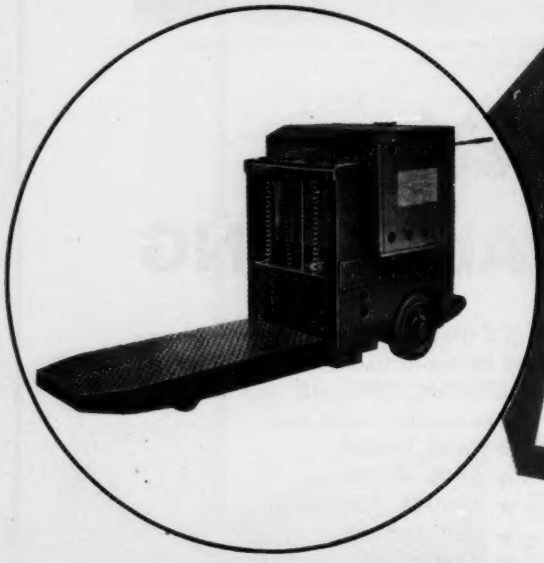
STEEL STRAPPING AND CAR BANDING SYSTEMS

MEET ALL FEDERAL STRAPPING SPECIFICATIONS

You Can't Go Wrong Using the RIGHT Truck!

RIGHT HIGH LIFT PLATFORM TRUCK

Truck without platform illustrated. Wheels turned to extreme position. Hardened and ground rollers are provided with oil seals and roller bearings. Platform slides over these rolls smoothly. This model available in various specifications as to platform, wheel base, etc.



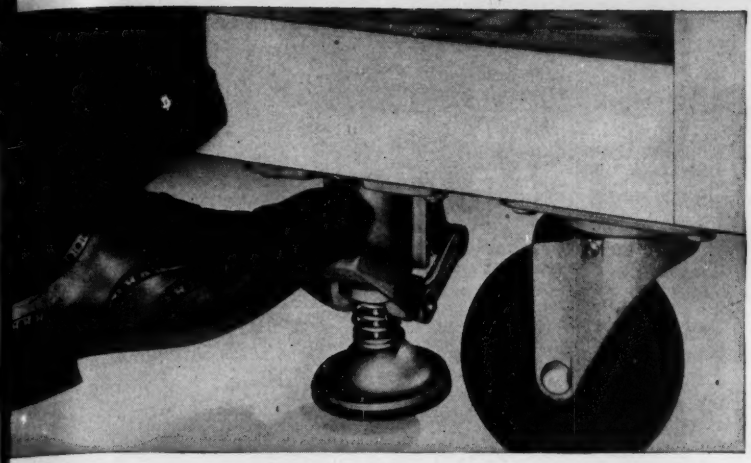
RIGHT LOW LIFT PLATFORM TRUCK

Capacity 2000, 3000 and 4000 pounds. Platform is elevated by two oversized roller chains driven by cut steel sprockets mounted on shafts which rotate on ball bearings. High and low elevating limit stops are provided together with intermediate manual control. Various models and capacities.

Let us send you our catalog which illustrates and describes the complete WRIGHT line. WRIGHT electric trucks have been manufactured for over 25 years and into each model has been built all of the experience and knowledge we have gained during this time. We were the first to manufacture the small industrial electric truck.

RIGHT TRUCK

WRIGHT HUBBARD INDUSTRIAL ELECTRIC TRUCK CO.
PORTLAND, NEW YORK



HOLDS PORTABLE EQUIPMENT

Right on the Spot

It's convenient — and efficient — to move materials, work or machines on casters. Now, *new* opportunities for *caster mobility* are created by the Bassick Positive Position Lock.

Portable equipment can be held securely against movement — where and when you want it.

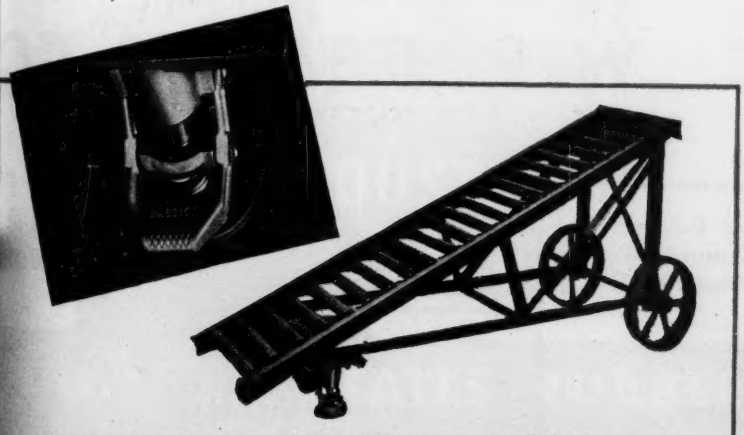
Easy to Install . . . Bassick Position Locks are available in various sizes and heights to fit most portable equipment . . . machines, floor trucks, work stands, scales, conveyers, scaffolds . . . even equipment operated on angle floor tracks. Flat top mounting plate is attached the same as casters.

Easy to Operate . . . A light downward pressure on the foot lever sets the "shoe" in contact with the floor. A slight upward pressure by the toe, under the foot lever, releases the lock.

Out of the Way . . . The lock is designed to be applied underneath the equipment, out of the way, yet always readily accessible for operation.

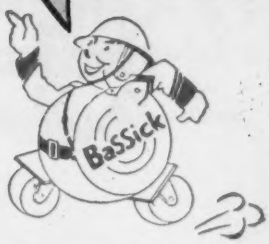
Positive Braking Action . . . Almost 12 square inches of friction-locking surface, held by heavy spring pressure in contact with floor. A universal joint keeps the locking surface snug against the floor, even where the floor is not level.

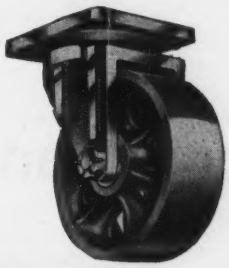
Will this Positive Position Lock help solve a materials-handling problem in your plant? Have Bassick — manufacturers of the largest line, and responsible for the important new developments in caster-conveying — help you make the most efficient use of casters. THE BASSICK COMPANY, Bridgeport 2, Conn. Division of Stewart-Warner Corporation. Canadian Division: Stewart-Warner-Alemite Corporation, Ltd., Belleville, Ont.



Two position locks used on a Webb portable conveyor. A typical practical use.

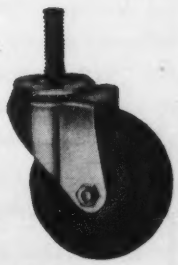
Bassick makes more casters
Of every size and type
So bring your problems to us
If you want to solve them right.





Super-Heavy Duty Precision Casters carry loads up to 10 tons per caster.

The "Floating-Hub" Caster absorbs shocks and vibration, moves easier, protects floors.



There's a Bassick stem caster for every type of need.

Bassick
MAKING MORE KINDS OF CASTERS
. . . MAKING CASTERS DO MORE

HEBARD
INTERNATIONAL HARVESTER POWERED

SHOP MULE INDUSTRIAL TRACTORS

Your Plant Needs This Shop Mule!

There are SHOP MULES for both large and small factories. The range of models is adaptable to foundries, steel mills, warehouses, railroads, marine terminals, air lines, aviation manufacturers, etc. 27 years contact with material movement problems! For complete Hebard SHOP MULE Catalog and assistance on your problem mail coupon below.

It is the Hebard A14 Victory Shop Mule . . . preferred Industry because it is International Harvester Powered and designed and engineered as a general purpose tractor is widely used for hauling and pushing materials, finis products, scrap, etc. at minimum cost. If you had one, o fleet of them, in your plant, work would move faster at lo cost! The A14 is only 42″ wide by 80″ long. Turns in a radius. Equipped with pneumatic tires, it navigates nar aisles and rough R. R. track crossings with ease. Attachme such as snow plow, rotary sweeper broom, electric arc weld generator, power take-off winch, etc. increase utility.

Complete information, parts and service available everywhere through International Harvester Industrial Power Dealers.

W. F. HEBARD & CO

2433 S. STATE ST., CHICAGO 16, ILL.

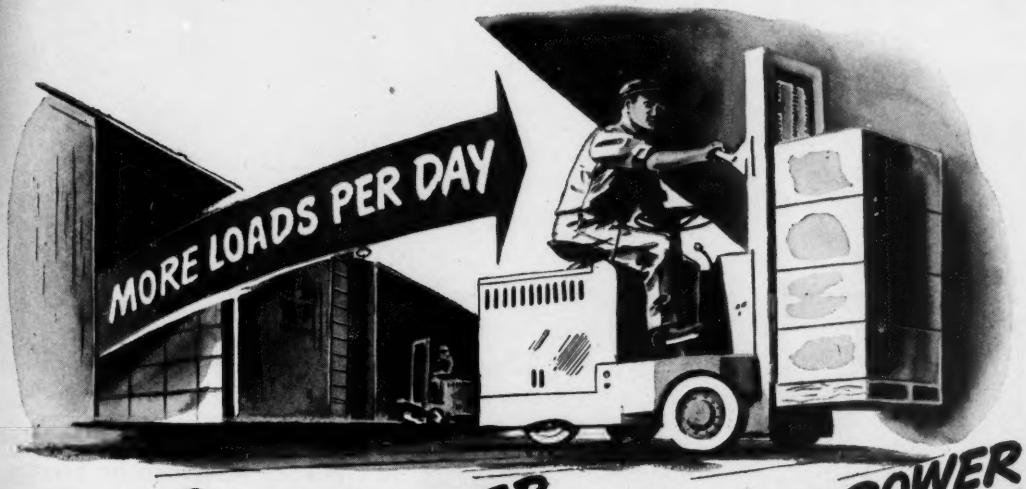
W. F. HEBARD & CO.
2433 S. State St.
Chicago 16, Ill.

Mule Power Sounds Good!
Send Your Catalog

FIRM .....
INDIVIDUAL .....
TITLE .....
STREET .....
CITY ..... STATE.....

HEBARD A3 VICTORY SHOP MULE

Now-"U.S." Announces NEOPRENE INDUSTRIAL TIRES!



EASIER STARTING — **EASIER ROLLING** — **LOWER POWER CONSUMPTION**

For More Work from your Industrial Trucks SPECIFY

U.S. *Neoprene* **INDUSTRIAL TIRES**

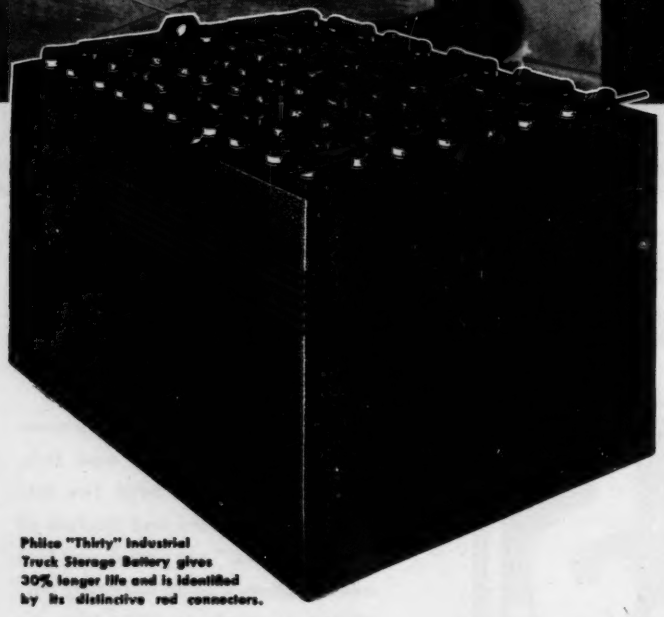
In Every Service U. S. Tires Excel

Here's the biggest industrial tire news since prewar days—the new U. S. Neoprene Industrial Solid Tire that will rid your trucks and tractors of "sluggishness," cut power and fuel consumption, step up operating efficiency as much as 60%, increase speed, haul more loads per day at less cost per load.

Fast-starting, easy-rolling, oil-resisting U. S. Neoprene Industrial Solid Tires are built to do *your* job better than ever before. Call your U.S. Tire Dealer today.

UNITED STATES RUBBER COMPANY

SERVING THROUGH SCIENCE 1230 SIXTH AVENUE · ROCKEFELLER CENTER · NEW YORK 20, N. Y.



Philco "Thirty" Industrial Truck Storage Battery gives 30% longer life and is identified by its distinctive red connectors.

FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

Tune in The Radio Hall of Fame, with Paul Whiteman and His Orchestra, Sundays, 6 P. M., EST; The Breakfast Club with Don McNeill, 9:45 A. M., EST, Monday through Friday—ABC (Blue) Network (Coast to Coast).

MODERN ELECTRIC INDUSTRIAL TRUCKS POWERED BY COST-SAVING PHILCO "THIRTY" STORAGE BATTERIES

Now you can get the kind of industrial trucks war experience proved the safest, most flexible and maintenance-free — ELECTRIC TRUCKS! And you can power your trucks with the greatest materials handling development since the fork-lift truck, itself—PHILCO "THIRTY", the Storage Battery with 30% longer life! Plan now for the big demands peace-time production will place on your materials handling equipment. Philco "Thirty" will give your trucks top capacity, *plus* savings in maintenance, depreciation and replacements. Write today for new catalogs giving specifications.

PHILCO CORPORATION • STORAGE BATTERY DIVISION • TRENTON 7, NEW JERSEY

PHILCO *Famous for Quality the World Over*

Flow

The magazine which integrates material handling equipment into the flow of production.

Vol. 1, No. 2

NOVEMBER
1945

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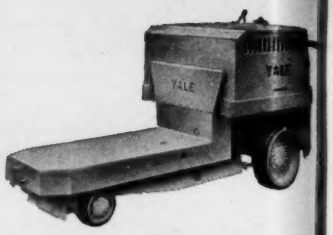
COVER PHOTO: How would you handle this product—miles of lustrous cellulose tubing used as casing for sausage and other meat products? The tubing, here shown at the end of the extrusion process, is about to enter the drier. Beyond the drier, the finished product ishandled and transported efficiently by means of standard mechanical devices. See story on page 26.

Yale Hoists — hand chain and electric models — are efficient time and labor savers that make light work of heavy lifting jobs —conserve worker energy, speed production and maintenance and cut handling costs.



Yale Electric Industrial Trucks save time effort—are power-packed to speed the ment of tremendous tonnage per day— fast and maneuver easily in congested High lift models save storage space.

Yale Hand Lift Trucks gedly built for long life— easy lift, easy roll, easy take the shorter hauls clip. Wide range of mod capacities for efficient of skids, skid bins, and

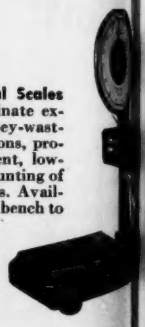
Every Lift Boosts Production Economy . . .

. . . whenever powerful, efficient Yale Materials Handling Machinery and methods are employed to save time, to conserve worker energy, and to permit skilled craftsmen to concentrate on *production*.

For in doing these things, *hidden costs* in lifting and shifting materials are wiped out—costs which, unrepresented by any single item on your books, nevertheless contribute to high production costs.

Boost production speed and economy in *your* plant. Use Yale Hand and Electric Hoists, Hand Lift and Electric Trucks for efficient materials handling, and Kron Scales for accurate weighing, counting, batching, measuring and testing.

All the facts about easy-to-use, cost-cutting, "safety first" Yale Materials Handling Machinery are yours for the asking. Phone our nearest representative or write to the Yale & Towne Manufacturing Co., 4530 Tacony Street, Philadelphia 24, Pa.



Kron Springless Dial Scales made by Yale, eliminate excessive time and money-wasting handling operations, provide accurate, efficient, low-cost weighing and counting of all kinds of materials. Available in all types from bench to crane scales.

MATERIALS HANDLING MACHINERY

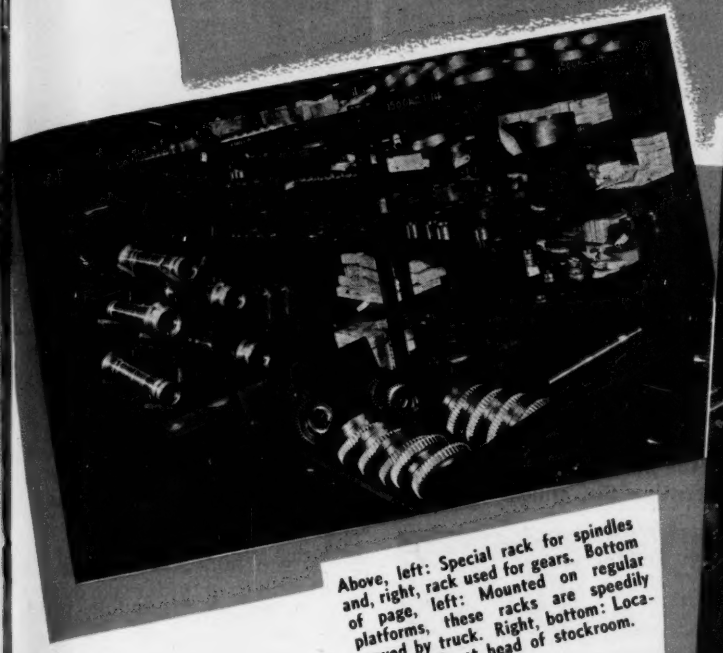
CUTS PRODUCTION COSTS . . . SAVES TIME . . . SAVES EFFORT . . . PROMOTES SAFETY

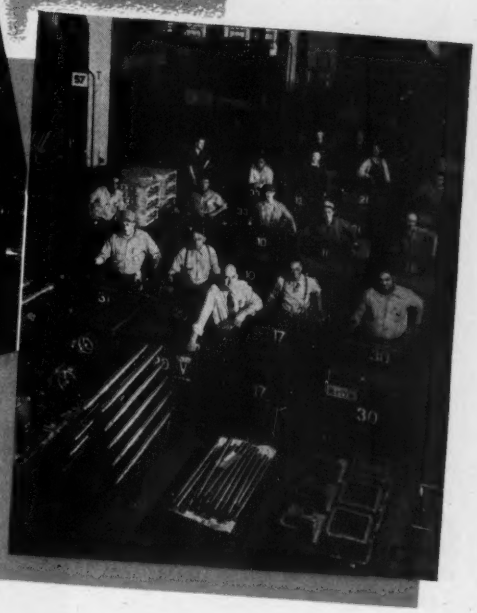
HOISTS—HAND AND ELECTRIC • TRUCKS—HAND LIFT AND ELECTRIC • KRON INDUSTRIAL SCA

FLO

EVERYTHING *Under Control* IN THE STOCKROOM

Moving 19,000 different parts (many of them of complicated fabrication) in the right quantities to the right place at the right time—material handling in the stockroom of a well-known turret lathe manufacturer.



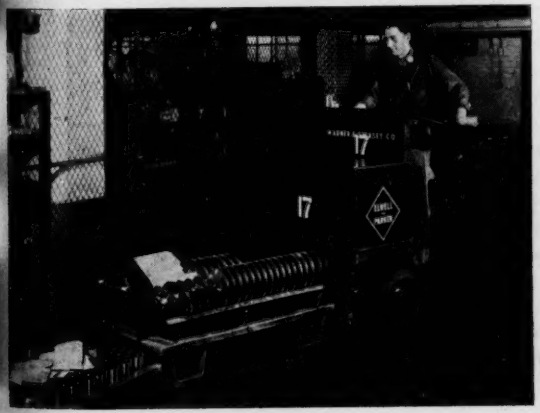


A sizable fleet, below, moves material to and from storage and between production departments.

Above, left: Special rack for spindles and, right, rack used for gears. Bottom of page, left: Mounted on regular platforms, these racks are speedily moved by truck. Right, bottom: Location file at head of stockroom.

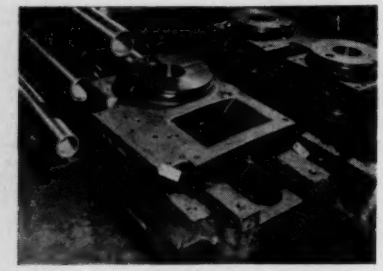
DURING the war the Warner and Swasey Company, like many others, had to provide storage for huge quantities of parts and this was accomplished with a comparatively small increase in storeroom area. How it was done is almost a story in logistics.

At this company, "storage" is a fluid concept, one that is related to production and on-date delivery of finished machines. This idea governs every one of the operations—ordering, receiving, storage, disbursements. That is why the stockroom is operated by the production control department. The latter does the buying of all castings and forgings, as well as the issuing and scheduling of all parts to and from the stockroom, and to the assembly and shipping departments. Constant vigilance is exercised to obtain maximum space utilization.



Ordering and Receiving

The ordering of parts starts months ahead of the assembly date and is based on the approved production schedule. The production control department obtains from the engineering department a parts list (bill of material), which lists the quantities of every type of part needed for the units indicated on the schedule. The perpetual inventory records are then checked for



Heavy finished parts like these, stored on the floor, are simply located by section and row.

(a) what has to be made up in the shop and (b) what finished items have to be purchased. The requirements are then posted on the No. 1 inventory card (see below). The quantity "in process" and "in stock" is subtracted from the requirements, and the difference is the amount to be made up.

The perpetual inventory is a simple system using three stock record cards: (1) For ordering and requirements (for parts processed in the plant). (2) For receipts and disbursements of these parts. (3) Essentially the same card as No. 1 and No. 2, but in a different color, is used to record finished purchased material.

When the ordered parts are finished in the shop, they go directly to the stockroom. They are then crossed off the "order" column on card No. 1 and added to the "amount on hand" column on card No. 2.

In order to eliminate the necessity of posting disbursements on stock records for all small purchased parts, a reserve storage equal to the delivery schedule of the purchasing department has been set up. Example: If it takes three months to obtain delivery on such items, then a three-month supply is ordered. When the stock in the regular bins is used up the stock clerk merely transfers the reserve stock to the regular bins and sends the production department a special form notifying it of the transfer. This permits an order to be placed for a new supply without the danger of running into shortages and having to rush the purchasing department to get the items in promptly. This method saves clerical work in the stockroom, eliminating shortages on all purchased parts, and saves time in the purchasing and production departments. Approximately 3,000 items are handled in this way.

Since all incoming forgings and castings are sent directly to the machine shop, they are not handled by the raw storage department.

Storage and Location System

The work flows in and out of the stockroom three shifts, six days a week. The tonnage is moved by powered and hand trucks on 48″ x 30″ steel-bound platforms with steel legs, which are standard throughout the plant. To prevent damage to the many ground and hardened parts handled, special racks are provided for spindles, gears, etc.

At the head of the stockroom is the location file, which is of the

Note that these medium heavy parts are stacked to within a few inches of the ceiling.

visible type and exceedingly flexible. It is used for locating all orders to be filled by the stock clerks.

Every type of part has its own storage area and location. While the heavier parts are located according to section and row, a more detailed system is used in connection with the small-parts bins. The location number 32-1-8-1, for example, tells the stock clerk that a particular part is in Section 32, Unit 1, Shelf 8, Bin 1.

The production control department is especially pleased with the flexibility of these steel bins. By the use of adjustable metal dividers a main unit or section can be subdivided into as many as 10 shelves and 36 or more different location bins.

The stockroom is divided into separate storage sections for the

View of section of "flexible" steel bins, used for storing thousands of small finished items.

following types of parts, most of which are shown in the photos:

1. Heavy finished parts, such as bar feed beds, saddles, turrets, and similar items too heavy to be put in racks or bins. These parts are storaged on the standard 48″ x 30″ platforms which are arranged on the floor.

2. A section of double tiered angle iron racks, with the floor space under them used as a third tier, serves for medium heavy parts. These are stacked and removed by powered elevating platform truck. Cubic use of the space in the low headroom basement area is similarly made wherever possible.

3. A third section, consisting of bins, is used for cutting tools—wrenches, collets, bushings, and chucks—which are sent out with the finished machines. Such tools are pulled out of stock and plainly marked 10 to 14 days prior to the date when the machines are scheduled for shipment. Another type of bin location is used for assembled small tools.

4. Shafts are stored on bar stock racks. Pulleys and wheels are kept in neat and sound condition by slipping them over vertical rods.

5. Thousands of small items (purchased finished parts) are kept

in metal storage bins, whose flexibility has been mentioned previously.

6. A two-tiered shelf section is assigned to bulky parts that are too large for the bins but which can be lifted by hand. Gears, guards, and large bearings are examples. The floor space under these shelves is used for the larger of these parts.

7. Bar steel is kept in a separate building directly connected with the main plant.

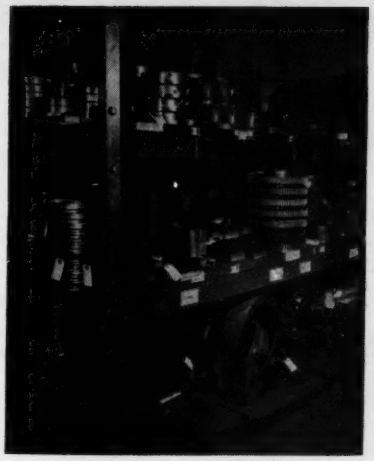
8. All supplies, such as grinding wheels, emery cloth, brushes, and others have their own storage area, on two-tiered shelves plus floor space.

9. The tool storage room, also located in the basement storage area, is controlled by the methods and equipment department. The heavy types of jigs and fixtures are stored on double tiered angle iron racks, which are constructed like those used for the storage of medium heavy parts. The smaller jigs and fixtures are kept in steel bins with adjustable shelves.

Disbursements

The pre-planned ordering and systematic stockroom operations help considerably in maintaining the company's reputation for meeting its delivery promises. A week or 10 days prior to the assembly date, the production control department sends the assembly parts list to the stockroom. The list is accompanied by wired tags which show the following information: 1. The part number. 2. Number of pieces. 3. Machine and lot number. 4. Bin locations. The stock clerk attaches the proper tag to every part as he removes it from stock.

The tagged parts are placed on a five-tiered assembly rack *in the order in which they will be used on the assembly line.* These racks, made up of the standard 48" x 30" platforms, remain in the assembly department until the assembly is completed, when they are returned to the stockroom.



Constant study of space utilization in stockroom makes possible effective use of overhead space in low headroom area. Shown here is one of two-tiered shelves on which are stored bulky parts that are too large for the small-parts metal bins (shown on facing page).

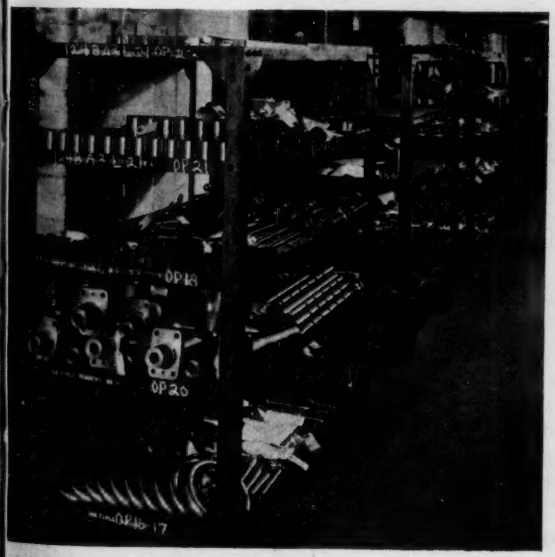
"You Have to Keep Revising"

Installed a number of years ago, the system is revised as often as necessary in order to keep the stockroom up to date with changing conditions. New machines require new parts, and the latter may necessitate a change in the size of bins or locations.

Here is another example of how the stockroom is being constantly adapted to changing needs. For the past several months an operator, assisted by two helpers, has been kept busy studying present storage practices with a view to obtaining maximum space utilization in every section of the department. Parts are measured, stock records are checked for quantity, and every effort is made to transfer items from on-the-floor locations to the tiered racks or bins.

Thus, stockroom operations are regarded as a manufacturing problem. And because of their important relation to on-time production and delivery of finished products, materials handling procedures in the stockroom are given the same consideration they receive in the production departments.

A line-up of five-tiered racks ready for assembly dept. Systematic arrangement of parts facilitates assembly operation (see article).



One of the company's numerous power trucks is shown moving a five-tiered rack loaded with many hundreds of parts to assembly department.

Were

Each card on shipping planning board, above, represents a car at siding, giving planner all data—instantly! Form, right, used for trucks

Partial view of large control board, which keeps shipping planner informed on tonnage that will be produced daily for specific customers. Both control boards help centralized department coordinate flow of goods to be shipped.

THE paper board industry had troubles—and plenty of them—to supply civilian customers during the war. With restrictions lifted after V-J Day, the demand for the industry's products increased astronomically. To take care of postwar expansion needs, customers immediately began to double and triple their orders for paper board, folding cartons and shipping containers. And the paper board products manufacturer had to keep pace with the volume.

THE Ohio Boxboard Company was prepared to meet greater peacetime demands with a modernized material handling program in its finished goods warehouse—a focal point of delivery for the company's three major production divisions. Begun about five years ago, the program made possible maximum utilization of minimum space for storage and production, as well as minimum handling in moving and loading a peak tonnage of finished goods. For the speedier and more economical movement of loads between converting departments, the production divisions were progressively equipped during the same five-year period with a number of powered industrial trucks for specific uses.

The Ohio Boxboard Company is one of the country's largest integrated paper board plants under one roof. Its three production divisions are as follows: (1) The paper board mill with a daily capacity of 500 tons of finished stock. (2) The folding carton division. (3) The shipping container division. The greater portion of the 500 tons of board made daily in sheet and roll form by the mill is converted by the folding carton and container divisions. Loads are moved with a minimum of rehandling all along the line.

Specifically, the comprehensive modernization program included the following: 1. Production planning. 2. Shipping planning. 3. Palletization of finished goods in all warehousing operations. Production and shipping planning were made the responsibility of the centralized

You ready?

BY FRED A. DE MARIA

Superintendent, Department of Production Planning, Warehousing and Shipping, The Ohio Boxboard Company

service department of production planning, warehousing, and shipping, which systematized the movement of the sizable daily volume.

Production Planning

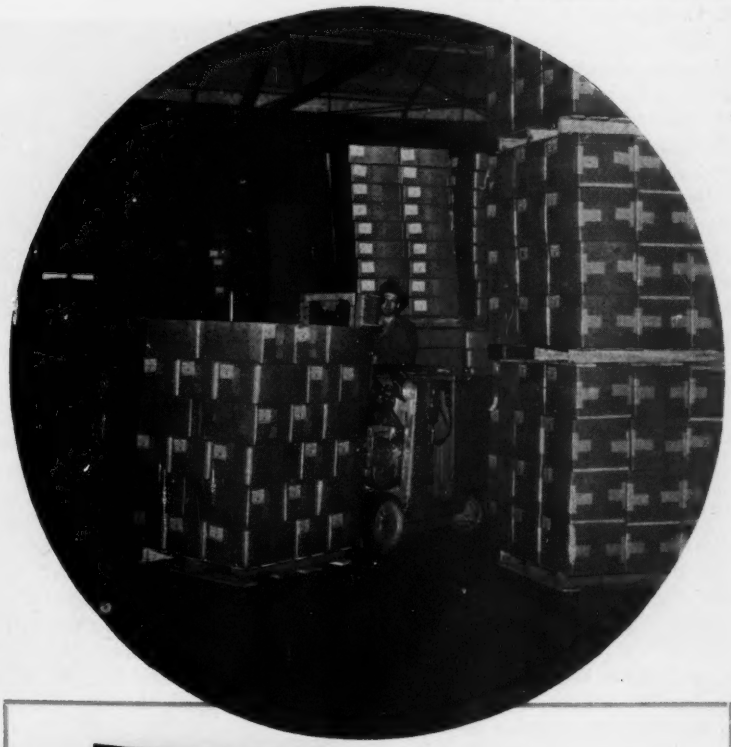
In cooperation with the production supervisors, the shipping planner keeps a vigil on all production lines in order to maintain a constant flow of finished goods from the three production divisions.

A production control board shows graphically the status of each production operation. This gives the shipping planner a clear, visual picture of how much tonnage will come through daily, and for which customers. Thus he is enabled to make the necessary arrangements for rail and trailer transportation facilities, which avoids bottlenecks and congestion in the finished goods warehouse.

Shipping Planning

The shipping planner has before him a rail control board which gives him all the pertinent facts as to the status of the loading operations at 22 car loading doors. Represented by means of cards on this control board are (1) the rail siding for converted products and

No overhead space lost here—one of the rows of palletized loads in company's warehouse. These cases of folding cartons are stacked to the rafters. Sketch of efficient floor plan appears on later page.



Most finished goods are placed on pallets at end of production line, and unit loads are speedily moved to warehouse by fork trucks. Here one is tiering bundles of corrugated board.

(2) the rail siding for mill or paper board to be shipped to outside converters (customers).

The shipping control board is spaced out in 22 sections, each numbered and representing a car door. A card is inserted under each number, which represents the actual car. The card shows this information: 1. Date of spotting. 2. Date of loading. 3. Date released. 4. Car number. 5. Route. 6. Order Number. 7. Commodity. 8. Destination.

With this information before him, the shipping planner is in a position to answer all questions on the part of customers and the sales department in regard to loading and shipping activities.

The control board also enables the shipping planner to keep track of the time when cars are spotted and loaded, and to load the oldest cars first. Thus demurrage charges are eliminated and the company is enabled to take advantage of the credits allowed by the railroads for loading the cars the same day they are spotted. Planned material handling is a big factor in car loading and in keeping cars on the move.

A similar method is followed in regard to trucking facilities except that a truck control form is used—one for each of three contract haulers. (The company does not operate its own trucking equipment.) This form identifies the trailers by number, with the length of the body listed under each number, and has columns for the following information: 1. Destination. 2. Customer. 3. Driver's name. 4. When spotted. 5. Time loaded. 6. Time left. 7. Weight. 8. A space for special instructions or remarks. (See "Handling Ideas" for details of two-way haul method.)

Thus, by means of the production control board the shipping planner is kept informed on the volume coming off the production lines; and through the shipping control board he is in touch with the warehouse and shipping supervisors. In conjunction with the production supervisors, this centralized service department also helps adjust the demands of the sales department to efficient production operations. Hence this department also serves as a "balance wheel" between the sales and production divisions, while at the same time it effectively coordinates the movement of finished goods between the production and warehousing operations.

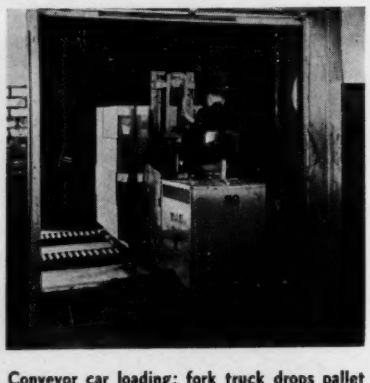
Advantages of Palletizing

The company began developing the present palletized material handling system in 1940. Prior to that time, the products were put on skids as they came off the production lines. These skids were of

Fork trucks like this one easily handle rolls of mill board weighing thousands of pounds

various sizes and heights and, since no powered lift trucks were on hand at the time, no tiering of loads was possible. This made for congested warehousing operations and ineffective use of overhead space.

Much rehandling was also involved. In order to utilize cubic space in the warehouse, the goods were taken off the skids and stacked high by hand. When the products had to be shipped, they were man-



Conveyor car loading: fork truck drops pallet load in door, then serves other cars at dock

ually reloaded on the skids.

Today, all finished material (except mill board in sheet and roll form) is loaded on double faced hardwood pallets as it is packed for warehousing or shipping at the end of the production lines. A standard size pallet has been developed for use throughout the finished goods warehouse.

Between 3,000 and 4,000 tons of finished material (folding cartons and knock-down corrugated containers) are regularly stored on pallets. These are conveniently tiered by fork trucks to a height of 14 feet, as shown in some of the photos. Approximately one ton of material is loaded on each pallet.

Sheets of mill board (averaging 40 x 60 ins.) and used by the company for further conversion are an exception to palletizing because of their size. However plans are being studied for palletizing these large sheets as well.

The change-over to pallets in conjunction with fork trucks has brought numerous advantages. Besides making possible maximum utilization of overhead space, the loads are also moved in a fraction of the time required previously. And because rehandling of loads in the warehouse was eliminated, productive labor was made available for other essential needs. Better housekeeping was another decided advantage, also a decrease in breakage and spoilage. The latter usually result when goods are stored directly on the floor and must be handled a number of times.

Centralized Warehouse

As can be seen from the accompanying layout sketch, the main finished goods warehouse is centrally located to the production departments as well as to the rail and truck loading facilities. To facilitate the movement of finished goods (mill board, folding cartons, and containers), a temporary storage area in the warehouse is adjacent to each production operation.

Efficient warehouse layout and operation depend a good deal on planning ahead for space requirements, which is also made possible through the centralized production and shipping planning office. The warehouse foreman contacts this department in order to keep informed on orders that are coming through the production lines. This enables him to know whether such orders are to be shipped immediately upon completion or whether

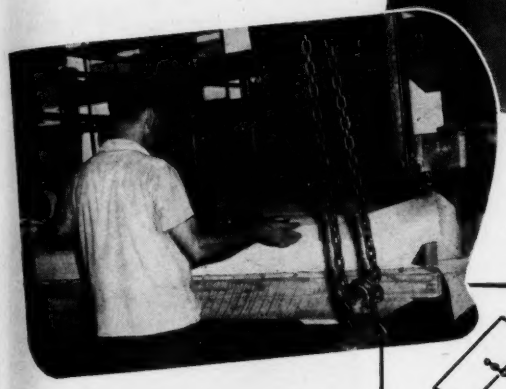
(Continued on page 42)

PRODUCTION ADVANCES

In The Bag AT CLOPAY CORPORATION

IN THE search for "the one best way" at the Clopay Corporation, Cincinnati, some new and some old tricks in the use of handling devices have solved many production problems. The company manufactures window shades, Venetian blinds, garment bags, and other paper and fiber products.

The layout and handling devices used in getting large rolls of paper to and from the raw material storage area make possible the use of the much desired "first in, first out" material control. Another result is maximum storage of roll paper in minimum space.



A traveling overhead electric hoist lifts incoming stock with a sling. The long rows of paper in the storage area extend at right angles to the travel of the hoist. After the stock has been placed on top of the proper row, it must be moved into position, which may require moving the individual rolls a maximum distance of 70 feet to the opposite end of a row. (The stock is put into storage at one end and withdrawn for production at the other.)

The "trick" was to level off the gaps between the rolls in order to have a level surface for rolling the stock when a second or third tier was to be made. To accomplish this, special chocks were devised. These consist of two blocks of wood cut at the proper angle to fit the curvature of the rolls. To prevent slipping, each pair of blocks is connected by a chain and eyes. (See sketch and Figure 1.) By use of these chocks the stock can easily be rolled over a row of paper.

The Window Shade Line—Trick No. 2

Rolls of crepe paper used in the production of window shades are moved from machine to machine on a cradle-type four-wheel flat truck. After finishing, drying, and rewinding, these rolls are set on skids—two on the bottom and one on top.

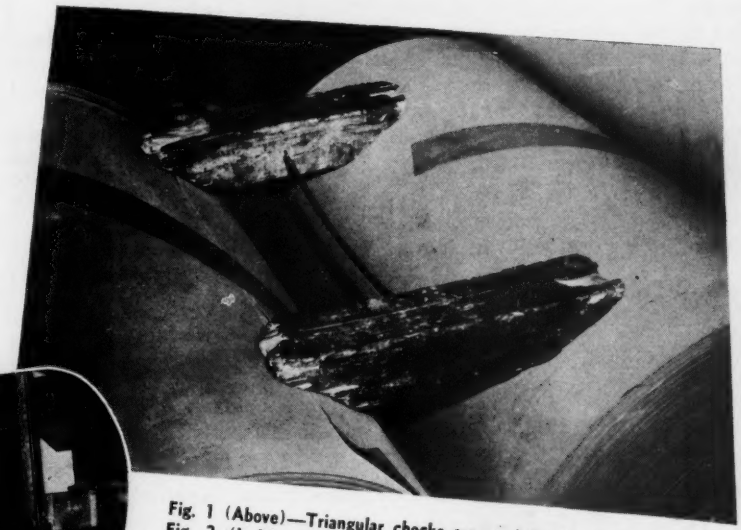
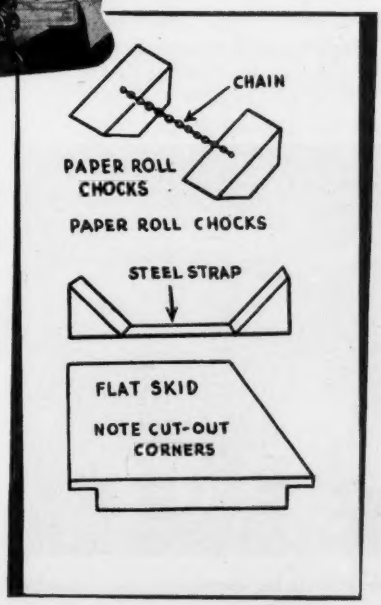


Fig. 1 (Above)—Triangular chocks are used for blocking rolls of paper.
Fig. 2 (Left)—Cut-away corners of flat skid fit over hoisting bars



The loaded skids are moved by power or hand lift truck to the sheet cutter machines, where the rolls are removed for processing. The empty skid is then used at the output end of the machine to receive the 3,000 shades produced from the three rolls.

As a result of this method, no empty skids clutter up space in temporary storage, and they are kept in constant use. Also, a lesser number of them is required for handling and processing operations. This was partly made possible by making the skids of the same length as that of the window shades.

To keep the rolls from falling off the flat surface of the skids, trick No. 2 was used. The surface had to be flat to receive the window shades, and any chocks or supports

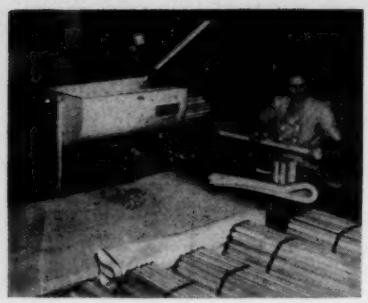


Figure 3.

used to hold the pyramided rolls in position would have to be removable.

To meet this need, two triangular wooden blocks, connected at each end by steel straps, were designed (see sketch). The straps are approximately the length of the skids, and thus proper blocking is provided at each end for the rolls of paper.

Trick No. 3

Trick No. 3 transformed the standard skids into receiving tables

Figure 4.

for use at the output end of the sheet cutters. This was done by cutting away the skid runners at the four corners to receive the hoisting bars (see sketch and Figure 2).

A transfer truck moves the loads of shades to the main building. There, on long tables, the shades are wound on wooden rollers by means of powered spinners. These spinners complete the assembly in a second or two (Figure 3).

The assembled shades, placed in cartons, are put on a roller conveyor which carries them to the inspection table. From here the cartons are moved by gravity chute (Figure 4) to the basement shipping station in an adjoining building.

Novel Conveyor for Garment Bags

Considerable tonnage of roll paper is used in the manufacture of

Figure 6.

garment bags. An overhead electric hoist puts the rolls into the bag tubing machines from a nearby zone storage area. The bags are then moved to further work stations, until they reach the "window" line. Here a plastic window sealed in a cardboard frame is glued to an opening on the front side of the bags.

The window line consists of a long table and a conveyor, the latter mounted on a supporting framework that extends the length of the table (Figure 5). The operator shown on the elevated level feeds the garment bag windows

Figure 7.

through a gluing machine onto the pans as they move by on the continuous circuit.

Each slot has a protruding edge keyed to a particular notch in the rail. The pan drops down when it hits the proper notch, discharging the window into a metal trough (Figure 6).

Note that the pans are identified by number, each number corresponding to a work station. This permits the feeding operator at the head of the line to "skip" any pans in the event certain work stations are not occupied.

Figure 8.

From this station the skid loads of bags are moved to the side clamp machines, then to the top hooking machines. At the latter point, transfer is made to a six-wheel "bag poster truck" (Figure 7), which is equipped with four stakes on one side only (for easy removal of the product at the fold-

Fig. 5—The "Window Line." The operator at left feeds the bag windows to a gluing machine.

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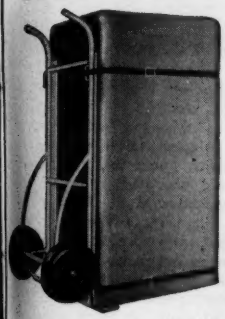

Refrigerator and Furniture Truck

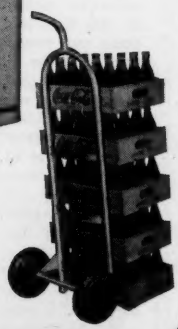

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Figure 9.

ing station). The folded bags are moved to the shipping department on the caster dollie shown in Figure 8.

Special Trucks for Venetian Blinds

Paper and chip board stock for these blinds is also handled by means of an overhead electric hoist,

Figure 10.

which places the rolls into the slat machine. The slats are placed in the specially built racks shown in Figure 9. After inspection, the product is moved to the final assembly on the rack truck shown in Figure 10. The advantage of this truck is that it brings the work to the stringing tables at the proper level for easy removal. The assembled blinds are placed on a belt conveyor, running in a wooden trough, which delivers them to the packers.

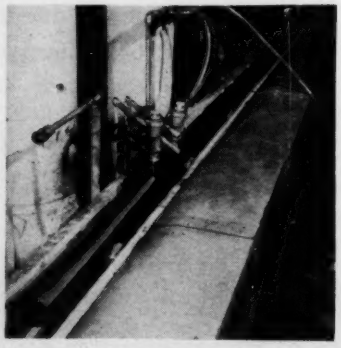
Thus each material handling device—hoists, skids, conveyors, dollies, and specially designed trucks—are engineered to the requirements of the specific operation and the type of product handled. The net result is efficient movement of all material through processing the high speed way.

IDENTIFYING BAR STOCK

ARE you faced with an identification problem requiring serial numbers and letters to be painted on tubing or bar stock? It used to take forty employees to do the job at a certain point in the Glenn L. Martin Company operations. Now it is being handled by four through the development of a new stencil holder.

The bar stock or tubing is placed on a conveyor which passes the stock under a paint sprayer which stripes the proper identifying color its full length. The material then moves on to the stenciling operation where the operator uses the new holder to mark the material. Linen stencils are used in preference to common paper stencils because they wrap around the stock more securely and do not smear when the stencil is removed.

The holder is rectangular in shape with an open top, the stencil forming the bottom of the "box." The linen is suspended by springs from small flanges at the top of each holder. When the holder is pushed down over the top surface of the stock the stencil wraps itself tightly. After spraying the stencil from the open top, the holder is lifted and the springs pull the linen



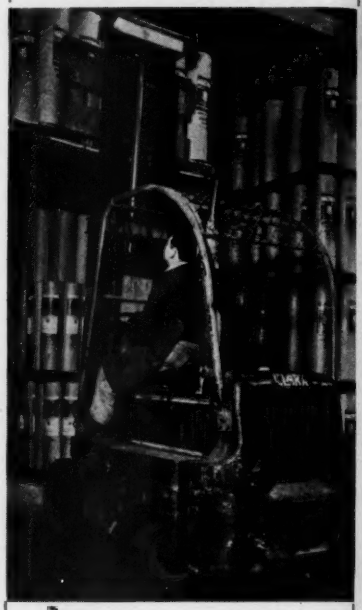
off the stock, which results in a perfectly stenciled number with no smearing.

* * * *

If a load appears to be too heavy for you to lift safely, request your supervisor to assign someone to help you.

TIERING JOB

Some years ago a production control system was installed at The Paraffine Companies, Inc., California plant with the objective in mind of leveling out peaks and valleys in the production schedules. To do this and maintain a more or less level production it was necessary to increase the warehouse space considerably. There were several ways of doing this; one was to build more warehouses and the other, a more economical way, was to fully use the space already available in the Pabco



warehouses, namely: increase the heights of piles, etc.

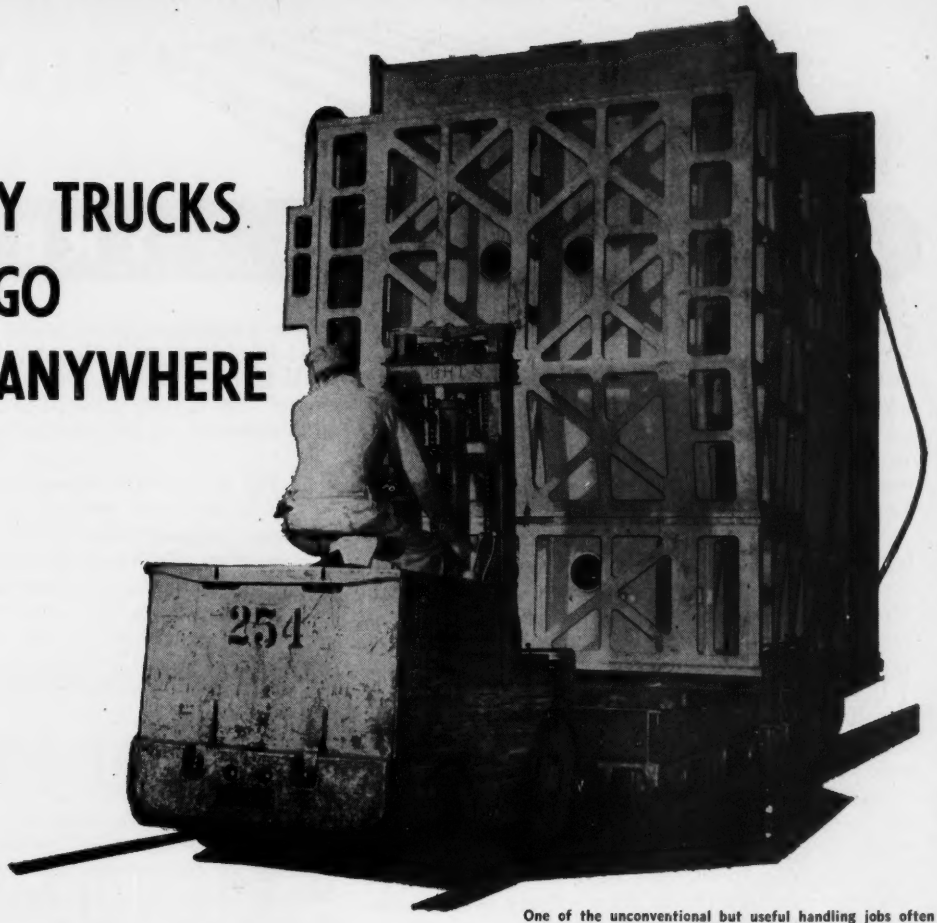
The answer to this problem was found in the selection of lift trucks whereby material could be placed on the flats and elevated into tiers three and four layers high. A number of these lift trucks were purchased and put into operation. Although they were an answer to the storage problem, it was found that a definite safety hazard was created, as the driver of each lift truck was practically unprotected from falling materials.

A high percentage of the materials handled in the Pabco warehouses is rolled roofing which is stood on end on the various flats and when lifted high above the truck puts the driver in a very precarious position.

After several drivers had been struck on the head and shoulders by falling rolls with various degrees of seriousness, efforts were made to give these men some protection.

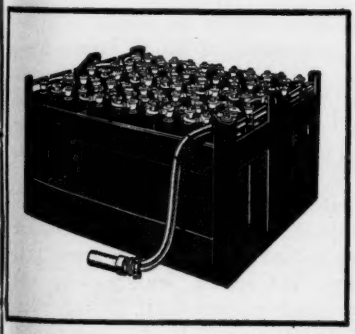
Through suggestions submitted by various members of the warehouse crew, by foremen and the safety engineer, guards were made up and installed on the lift trucks. "Since the installation of these guards," says A. M. Green, Paraffine's Director of Safety, "there has not been one single accident to a driver from falling materials." 14 of these trucks are now in operation.

BATTERY TRUCKS GO ALMOST ANYWHERE



One of the unconventional but useful handling jobs often performed by battery industrial trucks is to push or pull heavy loads between craneways..

. . Alkaline Batteries Give Them Most Trouble-Free Power



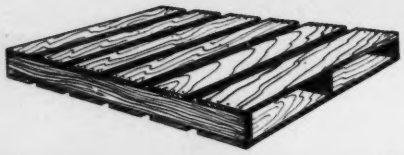
BECAUSE they are quiet and free from fumes, battery industrial trucks can be used without restriction in virtually any department of the plant. They can even be provided with spark-enclosed construction for operation in locations where fire and explosion hazards may exist.

They use low-cost electric power, and they use it with maximum economy, because they start instantly, yet consume no power during stops. With electric-motor drive for both traction and lifting, they have a minimum of wearing parts; are easy to maintain; are rarely out of service for repairs.

Thus, they are inherently dependable and economical, and this is especially important in the war industries where they are working 24 hours a day. Here they have the additional advantage of operating from one battery while another is on charge; except for the few minutes needed to exchange batteries, they need not stop for servicing of the power unit.

They are extra dependable and extra economical when Edison alkaline batteries are used. With steel cell construction, a solution which is a natural preservative of steel, and a fool-proof principle of operation, they are the longest-lived and most durable of all storage batteries. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.*

Edison
ALKALINE BATTERIES

ON THE  PALLET

NEWS · VIEWS · TRENDS

CHARLES F. KELLS has been appointed secretary of the Electric Industrial Truck Association (which includes leading manufacturers of battery trucks, batteries and charging equipment). Kells will make his headquarters in Pittsburgh, according to E. W. Allen, West Orange, N. J., president of the Association which up to this year was known as the Industrial Truck Statistical Association.

Mr. Kells will manage the new postwar educational program of the Association. Mr. Kells, a Cornell University graduate, has been associated with West Penn Electric Company and the West Penn Power Company, and was a dollar-a-year-man with OPM.

JUDGMENT of the speed with which a given load can be hoisted safely will pass from the crane operator to a new electric hoist drive soon to be incorporated in many types of indoor and outdoor cranes. Loads will be measured automatically by the drive as it takes hold, heavy loads being lifted or lowered slowly, light loads rapidly but never beyond maximum safe speed. If a load should prove to be too great an overload, the drive will say so—by refusing to budge it.—*Business Week.*

OUR genial supervisory editor, Curt Barker, Jr., was a speaker at the American Society of Mechanical Engineers New York meeting on Oct. 9th. His subject, "Palletization and Economies Afforded by Unique Units," was of intense interest to this meeting of the Materials Handling Division. The pot is boiling.

A LITTLE known fact is that, starting with 1939, the volume of production of industrial power trucks practically doubled each year for the next five years. Commenting on the growth of this part of the industry, "Domestic Commerce" for October says:

"There is little doubt that material handling is the most neglected of industrial functions. The methods to be found in many plants today not only are costly in themselves but create bottlenecks which seriously circumscribe the productive capacity of the most modern machinery. . . .

"Critics may be oversevere, but they have a strong basis for stressing the importance of material handling. Consider a simple but typical manufacturing process. Raw material is unloaded from a boxcar and stored (handling). It is requisitioned and carried to a producing department (handling). It is fabricated. It is placed in stock (handling.) It is removed for shipment (handling). The productive function appears once; handling occurs four times!

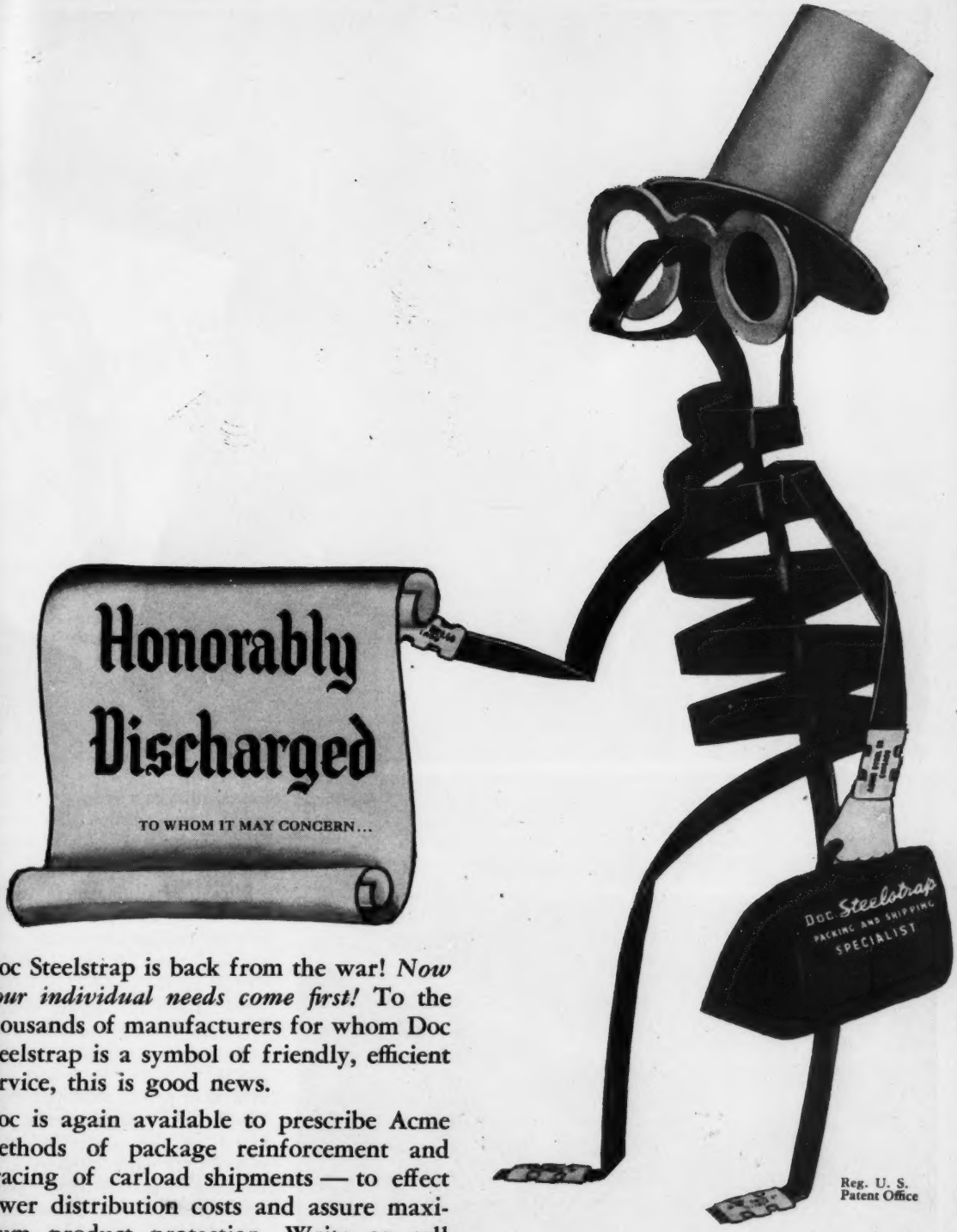
"No progressive plant would continue expensive hand labor in a producing department if a machine could be found or designed to do the job more efficiently. Yet in their material handling methods many establishments are 40 years behind the times."

QUITE a number of announcements of Army-Navy E Awards were received from various materials handling equipment manufacturers in the latter part of September. Technical printing difficulties made it impossible for us to announce these in the October issue and we believe that, while the entire industry is proud of these awards, by the time the information could have appeared in these columns the subject matter would have been of less interest than immediately after the war.

Everyone who has come in contact with the manufacturers in this industry knows of their contributions to the war effort, either in the production of their own equipment or in their contribution to higher production levels on the part of those for whom they had the privilege of engineering installations. Many Army-Navy E Awards made to people outside of the industry might well have been accredited to these material handling equipment manufacturers because, without their help, production levels could not have been attained or maintained.

MANUFACTURERS long ago found it profitable to refurbish their plant layouts for better materials handling, more efficient controls, better working conditions. They are familiar with such phrases as "functional design," "planned layout," "controlled conditions" (as to light, humidity, temperature, dust, etc.), but too many distributors fail to see where such refinements can affect movement of goods. Some, however, have seized on the slack of wartime selling to improve their operating quarters by streamlining their overhead, speeding handling operations, redesigning and improving their storage space. Others might do likewise.

Often warehouses and other real property of distributors were originally designed for other uses, are hand-me-downs from defunct businesses in areas that had seen better days. Yet selling, warehousing and distributing goods are highly specialized. In this postwar world, when distribution will be an increasingly important business factor, many a middleman would do well to study more efficient handling methods, install better warehousing facilities, smooth out carrying and shifting operations, re-examine his plant with a view to speeding movement of goods at a lower cost.—*Modern Distribution.*



Reg. U. S. Patent Office

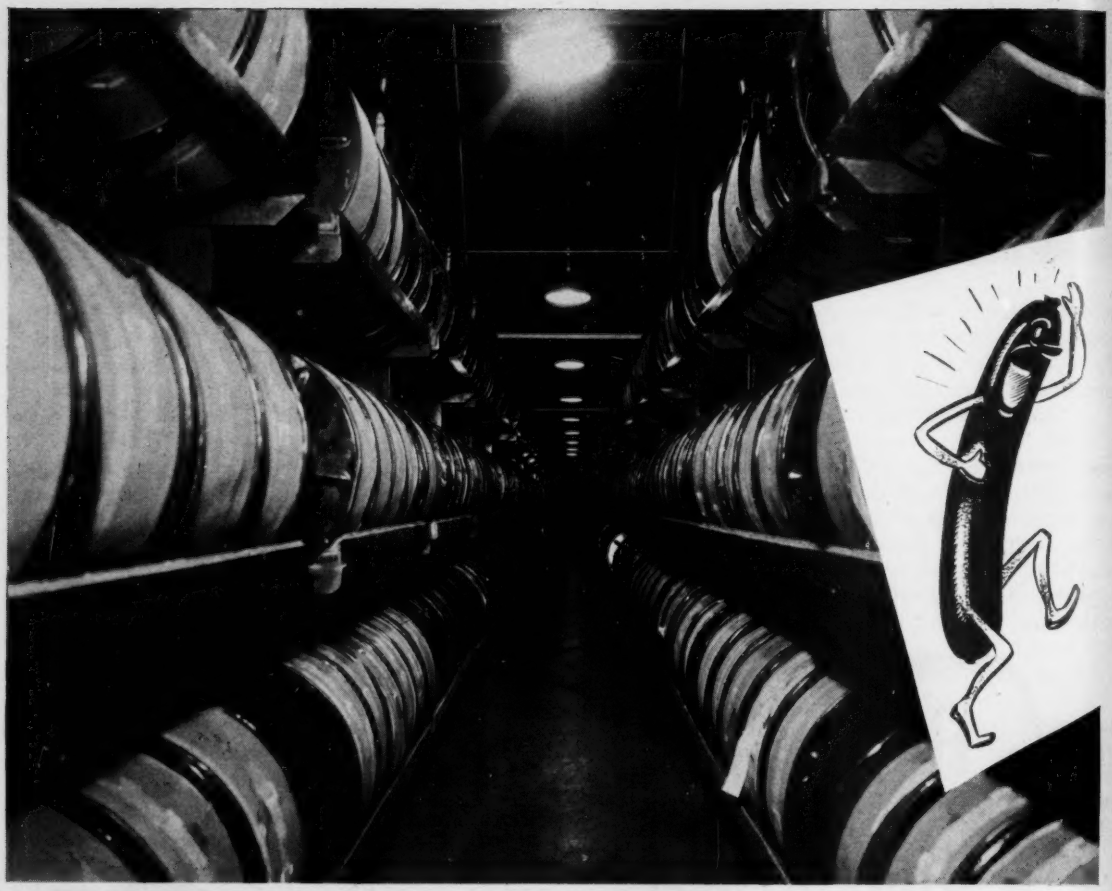
Doc Steelstrap is back from the war! *Now your individual needs come first!* To the thousands of manufacturers for whom Doc Steelstrap is a symbol of friendly, efficient service, this is good news.

Doc is again available to prescribe Acme methods of package reinforcement and bracing of carload shipments — to effect lower distribution costs and assure maximum product protection. Write or call any office.

New York 17 Atlanta Chicago 8
Los Angeles 11

ACME STEEL COMPANY

ACME STEEL CO. CHICAGO



Close-up of three-tiered racks, suspended in storage area from monorail system. Note that angle irons have wood fillers for protection of reels. Racks below receive full reels coming off drying machines, which are shown to left of monorail track.

THE Visking Corporation, Chicago, manufacturers cellulose sausage casings, and daily miles of these casings are wound on reels as they come off the drying machines in the production department. From the drying area, the reels (measuring from 18″ to 24″ in diameter) are transported to the storage area; and from here to the cutting or press (finishing) departments. These departments, all located on the ground floor, are served by a monorail system. The finishing department for skinless frankfurter casings, located on the second floor, is served by means of portable racks. Details on the latter are given in a later paragraph.

The accompanying layout sketch of the monorail installation shows that the main storage area is centrally located between the production and finishing departments. Thus the system ties in all departments, providing a properly co-

Hot Dog! they found The Perfect System . . .

An "overhead trucking system" provides the internal transportation that suits this company's need for moving sausage castings between the production, storage, and finishing departments.

ordinated flow of products between the operations concerned.

Prior to the company's expansion program several years ago, the reels were stored on fixed double racks which were anchored to the floor. Transportation to and from these racks was by means of skids and hand lift trucks or by special push trucks.

However, when a steadily mounting business volume demanded increased production facilities, a considerably larger number of reels had to be put in service. This in turn meant increased storage facilities. And in the larger storage area that was constructed the stationary racks would have been too far from the finishing operations for efficient movement of the thousands of reels that were added.

Hence the company decided to mechanize the handling of these reels. After study of several possible methods by the management and the engineering department, a monorail installation was decided on. The first installation, made several years ago, was soon after augmented with an addition that was more than twice the size of the original system. The entire system now in use comprises approximately 4,500 feet of track.

The installation permitted the racks with their loads of casings to be taken off the floor and to be "put up in the air," providing the mobility and increased handling capacity that the company's greater business volume required.

Coordinated Handling

Spurs extend from the central storage area into the production department, bringing the racks with the empty reels within convenient reach of the production operators. Each time a full reel is placed on a rack, an empty reel is removed and placed on a dryer shaft. When a rack is loaded with full reels, it is pushed into the adjoining storage area, and a rack with empty reels is then moved in to replace the one just removed. Thus the movement of the carriers to and from the work stations functions smoothly and efficiently.

As indicated in the layout sketch, the main switches are located at each of two exits from this production area. These are three-way rotary switches, equipped with a straight and two curved sections. This permits the loads to be rolled across the switching stations without turning the tables after the

A rack leaving the production department with a load of full reels for the adjoining storage area. Article explains how the 3-way rotary switch, shown, facilitates the routing of the carriers to any of the numerous branch tracks.

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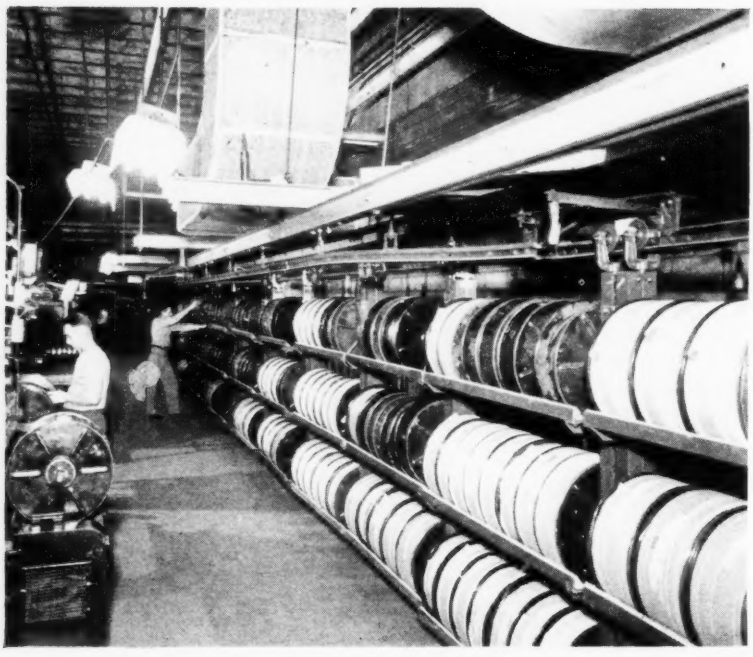

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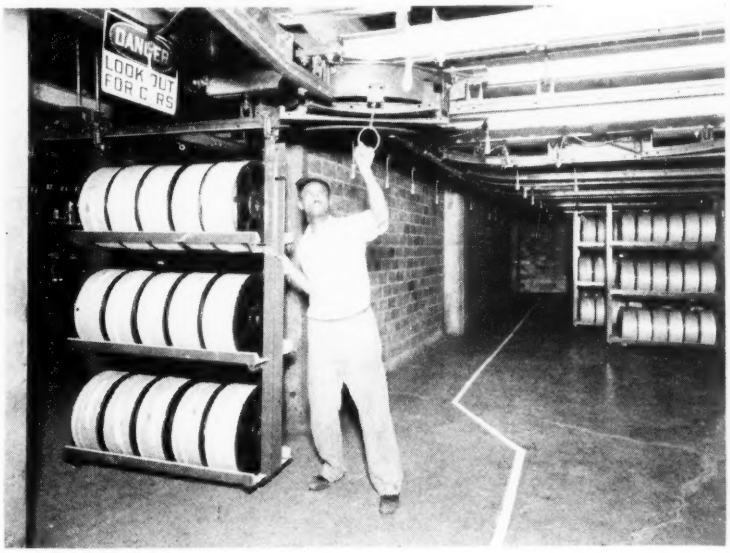


A rack leaving the production department with a load of full reels for the adjoining storage area. Article explains how the 3-way rotary switch, shown, facilitates the routing of the carriers to any of the numerous branch tracks.

SAFEGUARD A GOOD INVESTMENT AUTOMATICALLY

MANUFACTURERS of electric trucks and electric truck batteries put the finest of materials and workmanship into their products to help users reduce handling costs and speed the movement of materials. Both truck and battery constitute a good investment that must be safeguarded.

G-E Copper-oxide battery chargers are designed specifically to do the safeguarding job automatically . . . the job of keeping batteries always ready to go. There are models to meet the exacting charging requirements of all makes of large industrial batteries as well as the smaller requirements of batteries used in motorized hand trucks.

G-E chargers for lead or nickel batteries or G-E combination chargers to accommodate both are fully automatic, easy and economical to use. Spotted at strategic locations they're always set to deliver an initial high charging rate which reduces to a safe finishing rate that cuts off automatically at end of charge. G-E chargers offer astounding savings in time, labor and battery power. Initial cost is low and quickly amortized through reduced power bills and maintenance expense.

For complete information write to Section A1152-137, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn. Ask for a copy of truck charger bulletin No. 52-46.

Hear the G-E programs: "The G-E All-Girl Orchestra" Sunday 10 p.m. EST, NBC; "The World Today" news every weekday 6:45 p.m. EST, CBS; "The G-E House Party" Monday through Friday 4:00 p.m. EST, CBS.

GE

racks have been run on them. Thus the racks can be routed with minimum effort on the part of the operator to any of the numerous branch tracks in the system.

In the finishing department, too, the monorail system with its mobile racks makes for orderly,

Finisher, left, has work within easy reach.

systematic handling. When a full reel is taken off a rack to be put on a press, for example, the place on the rack is taken by an empty reel coming off the press. Here, as elsewhere, vertical use is made of available space and the products move freely to and from work stations. And use of overhead space naturally results in conservation of floor space.

Storage Also Improved

The storage area consists of numerous parallel sections of track, each of which is about 100 feet long. The mechanized handling in this department has contributed to better stock control. Racks with new

A load of casings goes to frankfurter floor.

stock are added to the lines at the south end and the older stock is removed from the north end. In this way the "first in" reels are also "first out," and this provides at all times proper circulation of the stock in storage.

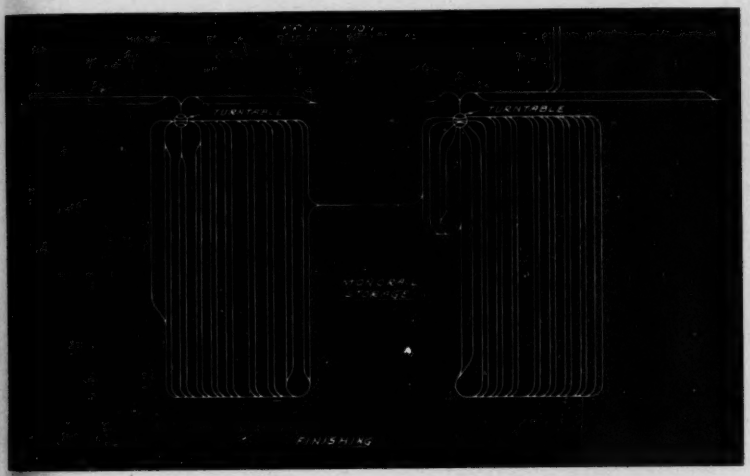
Neat arrangement of mobile racks in storage. See cut below for layout of entire system.

Efficient use is made of the storage area because the racks are arranged in double rows, with one aisle between each such row. Thus aisle space is saved without sacrificing accessibility to the reels stored on the racks. The labels on full reels are attached so that they face the aisles. And since the product is stored in mobile form, maximum convenience is obtained (and rehandling of the individual reels is avoided) in moving the casings in and out of the area.

Since the racks roll freely on the overhead tracks, it is not uncommon to see an operator push a train of three or four racks at one time between stations. This movement of large units is another advantage contributing to the efficiency of the over-all handling operation.

Skinless Frankfurter Casings

As indicated previously, the casings for the skinless frankfurters are finished in a department that is located on the second floor. These reels are placed on portable racks (see photo) which are moved by means of hand lift trucks. Since each rack can accommodate numerous reels, the servicing of the second floor department involves little traffic.



(Question: Why a casing for a frankfurter that is skinless? Answer: This casing serves as a convenient jacket for the raw meat product during processing. The meat juices developed during cooking and smoking congeal upon cooling, forming a smooth surface that permits the casings to be discarded after processing. Thus the cellulose "skin" is necessary for making the skinless frankfurter.)

Adequate to Need

The "overhead trucking system" has met both the handling and transportation requirements of the company. Because the loads were taken "up in the air," maximum utilization of existing floor space was made possible. The monorail installation also facilitated housekeeping by making all floor areas easily accessible for cleaning. And in addition to providing the greater handling capacity needed, the system also made possible the smooth and orderly movement of the product with minimum handling.

Mechanically Speaking

An interesting sidelight is how the stationary double racks, formerly in use, were converted to mobile carriers which are now rolling along on the overhead tracks. The horizontal members connecting each unit of two racks were first cut apart. The vertical members were then lengthened to the desired height by welding pieces of channel iron to them, and the monorail trolleys were attached to the top of them. This conversion of the old type fixed racks required correspondingly fewer new ones to be constructed.

Is it possible to push a rack off the track through an open switch? This cannot happen, for the switches are so constructed that any open ends of track are automatically blocked. Another safety feature is an automatic alarm device. The alarm is given by means of flashing red bulbs and a bell when a carrier approaches a main aisle.

An auxiliary feature soon to be added to the system is a beam type monorail scale. This will permit the weighing of loads without rehandling of the reels from the carriers.

LOADING ON PALLETS

LOSS of storage space and damage to goods may result when such items as cartons, boxes, bags, drums, and others are incorrectly piled on pallets. That is why the proper training of car gangs in correct loading methods is of paramount importance.

Cross hatching or piling should be made with all bags, bales, cartons, and boxes not having square dimensions. This method tends to key and lock in place this type of material, thus adding to the stability of the unit load.

The material handling engineer's job is a highly complex one. It calls for knowledge not only of the plant's immediate production flow problems, but also for finger-tip knowledge of what is new and efficient in handling methods. As a means of informing top management of progress, well-presented photos cannot be beaten. Here's how to take effective pictures.

Attention, MATERIAL HANDLING *Engineers!*

THOSE responsible for materials handling improvements in industry miss a good opportunity when they don't maintain photographic records of before and after conditions of modernized projects. Changes must usually be made by progressive steps, and by the time they are completed many forget the antiquated practices that were replaced.

Photos give you an excellent means of demonstating to top management what has been accomplished. Such illustrated reports should be brief and made periodically. They will impress the management with what can be accomplished and, therefore, give them reason to supply the needed support for further proposed improvements. Such photographs are also valuable for disseminating information on good practices in companies having many plants.

But before taking pictures, remember this rule: *A photograph taken from a certain angle may be worth more than two other photos taken without careful consideration of what the picture is to emphasize.* The comparative photos in this series are intended to help you take the kind of shots that will be effective.

Figure 1A is poor because one operation is shown in front of the other, with excessive idle labor. Figure 1B is effective. The complete operation is discernible and the whole gang is at work.

Figure 2A is bad—no sign of activity results in a poor photograph. In Figure 2B, the unloading operation by the girl operator corrects the dead impression.

Figure 3A represents a poorly chosen camera angle of the picture frame pallets, which reveals the tiering only partially. Figure 3B illustrates a well-chosen camera angle. Two sides and details of the top of this strapped palletized unit load are clearly shown.

Here are some further specific pointers which will help you obtain maximum benefit from photographs:

1. Is the device to be shown in use? If possible, get an action shot. Show the operation with an individual at work. This adds life and attention value.

2. Are unnecessary persons in the scene? Eliminate those that just want "to get in"; they usually detract from the interest of the picture.

3. Are any of the persons posing for portraits? Do not let operators stare at the camera. They should be taken in a natural position, with their eyes on their work.

4. Does the camera see several sides of the subject? Do not shoot straight at the front if another angle will show three sides in perspective.

5. Does the background confuse or interfere with the subject? Try to obtain a plain background of a contrasting shade or tone.

6. Can you see the top of the subject? Low camera angles may make excellent shots of bathing beauties, but photos of material handling methods and equipment generally require a view from above.

7. Is it possible to show the relative size of the article? In closeups, the introduction of a pencil or a person's hand is often useful in bringing out the size of the subject.

8. Are there any unbusinesslike effects? Look out for indelicate writing on walls and be sure that no one is smoking in a "no smoking" area.

9. Are you showing an improved procedure? If this is the purpose, photograph both the new and the old method for contrast, preferably showing each of a series of steps in the operation.

10. Will the picture have sufficient details? Watch for technical troubles like shadows, too much light in the background or lack of contrast. It often helps to supplement a series with closeups.

11. Will it be a time exposure? If so, stop operators and all moving equipment long enough to take the shot.

NOTE: FLOW is accepting from readers revealing photos — either single shots or series—that illustrate novel, modernized or otherwise improved material handling methods. From $3 to $5 will be paid for each acceptable picture, depending on the interest of the subject and the quality of the photos. Send along with your contributions a brief explanation of each procedure pictured. Address: Photo Editor, FLOW Magazine, Bolivar Publishing Company, 812 Huron Road, Cleveland 15, Ohio.

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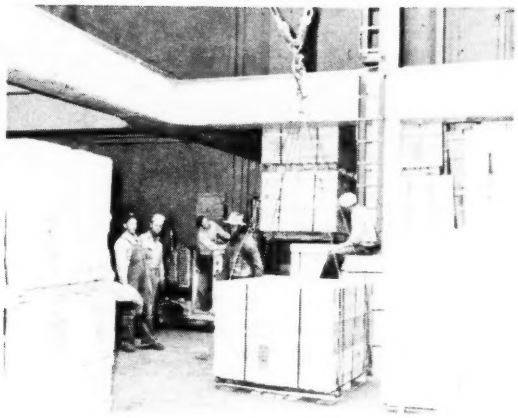


Figure 1A—Bad.

Figure 1B—Good.

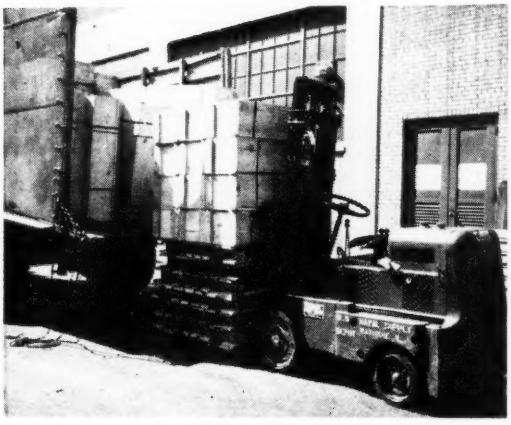
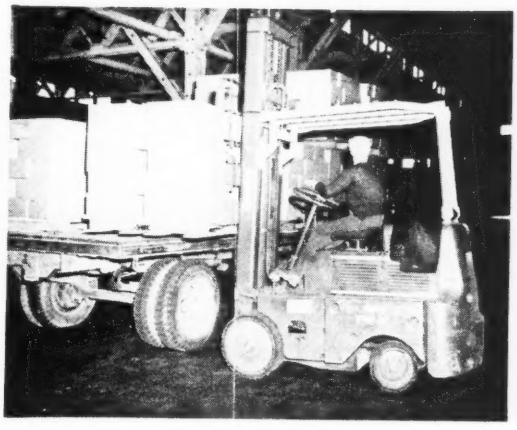


Figure 2A—Bad.



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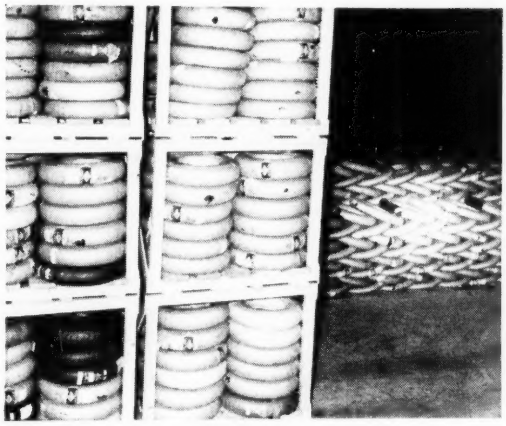

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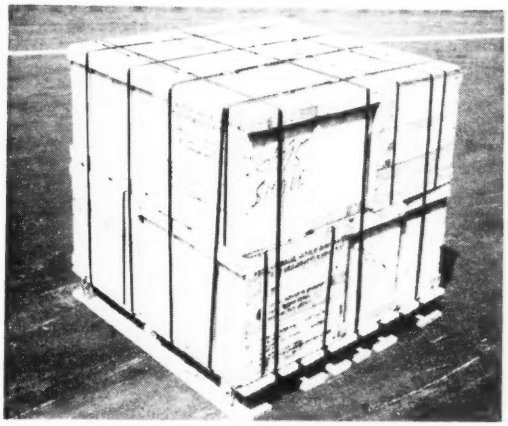

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2. Are unnecessary persons in the scene? Eliminate those that just want "to get in"; they usually detract from the interest of the picture.

3. Are any of the persons posing for portraits? Do not let operators stare at the camera. They should be taken in a natural position, with their eyes on their work.

4. Does the camera see several sides of the subject? Do not shoot straight at the front if another angle will show three sides in perspective.

5. Does the background confuse or interfere with the subject? Try to obtain a plain background of a contrasting shade or tone.

6. Can you see the top of the subject? Low camera angles may make excellent shots of bathing beauties, but photos of material handling methods and equipment generally require a view from above.

7. Is it possible to show the relative size of the article? In closeups, the introduction of a pencil or a person's hand is often useful in bringing out the size of the subject.

8. Are there any unbusinesslike effects? Look out for indelicate writing on walls and be sure that no one is smoking in a "no smoking" area.

9. Are you showing an improved procedure? If this is the purpose, photograph both the new and the old method for contrast, preferably showing each of a series of steps in the operation.

10. Will the picture have sufficient details? Watch for technical troubles like shadows, too much light in the background or lack of contrast. It often helps to supplement a series with closeups.

11. Will it be a time exposure? If so, stop operators and all moving equipment long enough to take the shot.

NOTE: FLOW is accepting from readers revealing photos — either single shots or series—that illustrate novel, modernized or otherwise improved material handling methods. From $3 to $5 will be paid for each acceptable picture, depending on the interest of the subject and the quality of the photos. Send along with your contributions a brief explanation of each procedure pictured. Address: Photo Editor, FLOW Magazine, Bolivar Publishing Company, 812 Huron Road, Cleveland 15, Ohio.

XUM

Figure 1A—Bad.

Figure 1B—Good.

Figure 2A—Bad.

Figure 2B—Good.

Figure 3A—Bad.

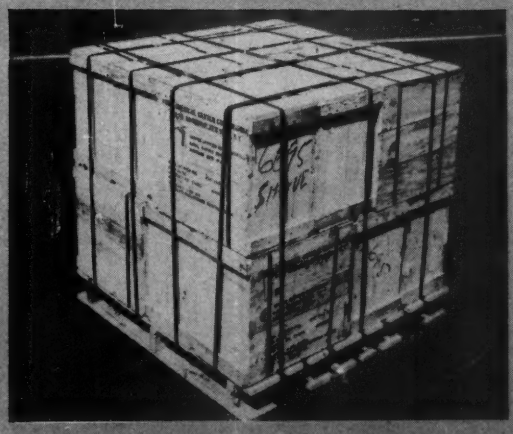


Figure 3B—Good.

The World's Largest Freight House was especially designed for the tractor-trailer system of freight handling. Here's how a vast tonnage is moved in record time daily.

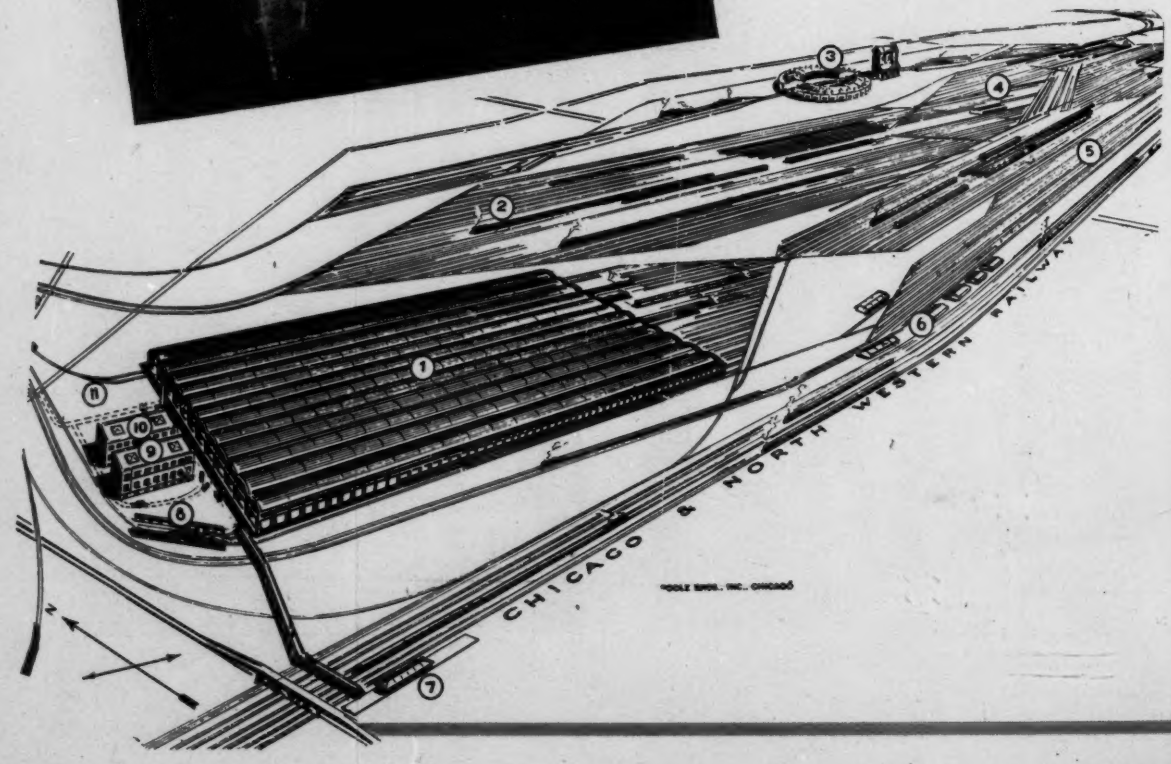
Working for the R

ALL THE LIVELONG

Sturdy, compact tractor, below, hauling long trailer-train from unloading platform. Every type of product is handled—from surgical gauze to heavy machinery.

EFFICIENT volume production methods are indicated when a less-than-carload freight house transfers 2,600 tons of merchandise daily. This volume comprises 15,000 individual shipments numbering approximately 150,000 pieces. The tonnage is unloaded from 10 trains of 25 cars each and from 225 truck units which are received and forwarded daily.

These are just a few of the statistics that meet one at every turn of the world's largest freight house (21 acres under one roof). It is



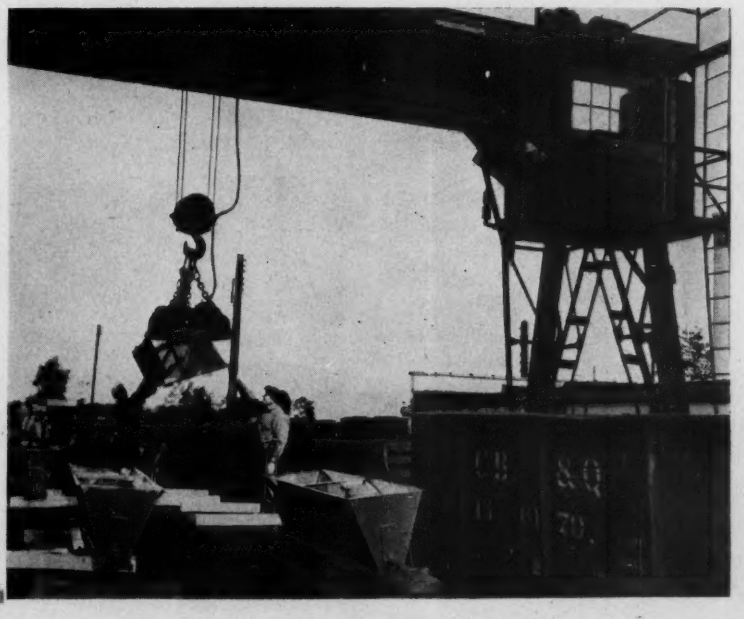
th Railroad
LONG DAY . . .

the Chicago and North Western Railway Company's Proviso Transfer Station, Proviso, Illinois, shown with only about half of its mammoth yard system in the accompanying layout sketch.

This $16,000,000 project was designed primarily to provide greater transfer and interchange facilities required by the steady growth of Chicago as the world's largest transportation center. The transfer station is ideally located about 14 miles west of C & NW's Chicago passenger terminal (well removed from the high-land-value and congested metropolitan center), at the junction of the railway's main line and the various belt lines which circle Chicago and act as connecting links between the great systems which terminate there. While the yard facilitates and speeds the segregation of local and through business, the freight house makes possible the consolidation of l. c. l. merchandise without the need of bringing it into the crowded terminal area. Thus the movement

Top: Tractor-train approaching electric lift bridge, noticeable by separation between intersecting platforms. Lower photo shows bridge being elevated for train to pass. Each bridge covers two tracks.

1. Transfer House
2. East Classification Yard
3. Roundhouse and Coaling Station
4. East Makeup Yard
5. East Receiving Yard
6. East Repair Yard
7. Proviso Passenger Station
8. Gantry Crane
9. Office Building
10. Record Building
11. Concrete Driveway Connecting with Lake St., Enabling Trucks to Receive and Deliver Direct to Platform



At left, part of the huge yard system with freight house in foreground. Yard to left of house, cut off here, is as large as part shown.

Right—gantry crane and lifting magnet unloading farm machinery from open-top cars.

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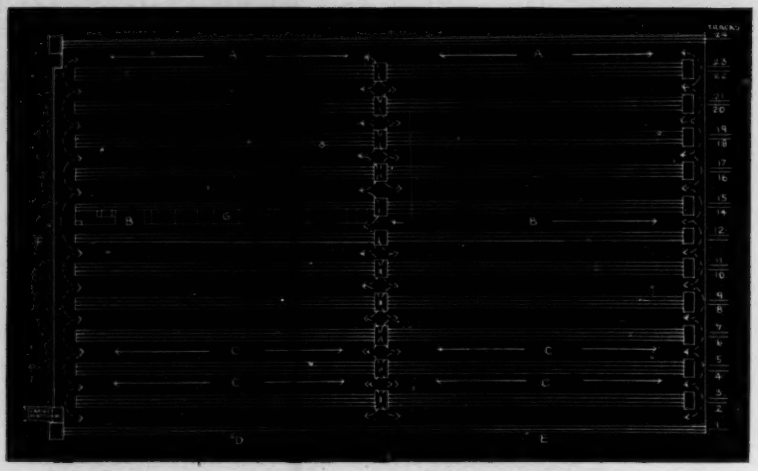

Floor plan of freight house: A&B—westbound unloading of cars, including freight from connecting lines. C—eastbound unloading of cars. D—outbound trucks to connecting lines (78 truck doors). E—outbound cars to connecting lines. F—in and outbound trucks (westbound and suburban territory; 35 truck doors). G—freight house service and office buildings. Rectangular boxes over tracks (at ends and in center) show location of numerous lift bridges.

of l. c. l. shipments is expedited considerably.

Of particular interest are two main features of the freight house: 1. The handling and movement of freight from incoming cars to outbound cars or highway trucks. 2. The layout which represents radical innovations in freight house design.

Large Fleet for Large-Scale Operation

A fleet of 60 tractors of all sizes is employed to haul approximately 3,000 4-wheel trailers in the station that measures 1,420 ft. in length and 620 ft. in width. Its 23 tracks have a daily spotting capacity of 654 freight cars, and 113 truck bays offer loading and unloading facilities for as many trucks. A pneumatic tube system connects the receiving and departing yards, yard offices and the freight house with the agent's office. Approximately five miles of tubes are used in the combined system.

Layout Features

The layout of platforms and tracks represent a radical departure from the usual freight house plan in general use throughout the United States. At Proviso, each platform for loading as well as unloading is served by two tracks. The flow of freight from the unloading platforms to the loading units is both through the center of the station as well as across the platforms at the extreme ends. This is accomplished by a system of three cross-haul platforms (running north and south) which intersect all east-west platforms, as shown in the layout sketch.

The sections of the cross-haul platforms that pass over the tracks are constructed as electric lift bridges. When a train is being shoved in or pulled out of the station, the bridges are raised to permit passage of the cars. Tracks 2, 22, 23, and 24 are open at both ends of the freight house to permit switching from either end. Tracks 1 and 14 are open at the east end and terminate at the center of the house. Tracks 3 to 12 and 15 to 21 are open at the east end and terminate at the cross-haul platforms at the west end.

This layout was especially designed to accommodate the tractor-trailer system of freight hauling used at the station. This method has proven itself efficient and economical because it provides rapid movement of volume tonnage. And fast "in and out" handling is a prime consideration in the movement of l. c. l. freight, which must compete with flexible door-to-door truck haulers.

The principal car unloading platforms, served by tracks 2, 14, 23 and 24 are 40 ft. wide. This width provides ample space for unloading cars, coupling of loaded trailers into trains, and the free movement of these trains in any desired direction. A width of 22 ft. is sufficient for the loading platforms. The specific platforms for the various loading and unloading operations are indicated in the layout sketch of the freight house.

Unloading and Loading—Eastbound

This operating unit handles the freight received from points in C & NW's system and beyond, and functions on the south end of the freight house on tracks 2, 3, 4, 5 and 6.

As the cars are set on the unloading track, the billing for them is assembled and lined up by the warehouse office for handling of the shipments. This billing travels with the cars in most instances, though some of it is received by mail ahead of arrival. Bills for freight received by truck accompany the loads.

The unloading is performed by check gangs consisting of five men each: one checker, one caller, one

View of some of the 113 truck doors, below.

motorman (tractor operator), and two truckers (the latter load the freight on the trailers). Each gang is assigned to a car or truck and given the necessary bills. The men check the freight against the billing, place the goods on the trailers, mark and veri-check them to the proper loading unit (track and spot number).

The hauling of these loads is performed by the motorman of each check gang. He arranges the trailers in trains, which is simplified by the automatic couplers on all equipment. He distributes the freight to the proper loading platforms and cuts up the trains to the various loading spots. The motormen are also required to pick up empty trailers and return them to the loading platforms for future use—empties are vital in such an operation as this one. Certain motormen are assigned to the specialized handling of such heavy equipment as machinery (see photos), which is moved on special low-wheel dollies.

The loading of this freight into outbound units is done by stowing gangs under the supervision of the platform foremen. The loaded trailers are taken into the cars for unloading. To insure proper forwarding of each complete shipment, the stowers are required to compare all marks and pieces against the verifying checks and bills.

Westbound Operation

This operating unit handles the freight received from connecting lines and from the Chicago switching area. This traffic is handled on tracks 11 to 24 inclusive.

As the cars are set on the westbound loading tracks 14, 23 and 24, the billing is assembled and lined up by the warehouse office for handling of the loads.

The unloading is performed by check gangs consisting of four men each—a checker, caller, motorman, and trucker. The checking and unloading proceeds the same as in the eastbound operation. This westbound freight is loaded on the trailers with the identifying veri-checks placed in the pipe racks of the trailers.

The hauling or distribution of this freight, including the stowing

(Continued on page 63)

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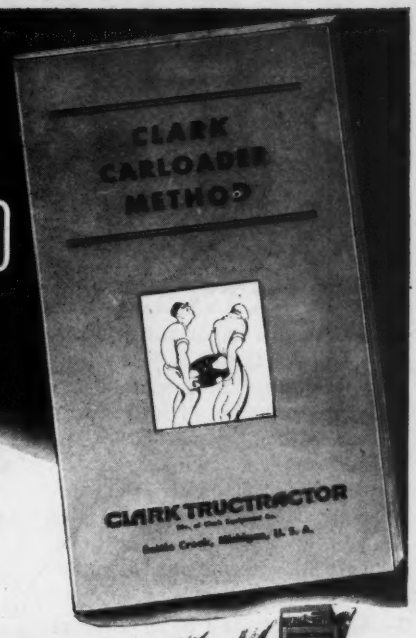
REVOLUTIONIZED MATERIAL HANDLING

...it defined and crystallized the unit packaging method



The publication of this book started men of industrial plants and railroads thinking along new lines.

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AMONG the important developments of the U. S. Navy, Bureau of Supplies and Accounts, was the standardization of instructions for car loading. Some of the specialized problems included, for example, such materials as compressed gas cylinders, and the rules shown below, with the illustrations, indicate the recommended practices for this particular load:

1—All lumber shall be of uniform thickness.

2—Hardwood lumber is preferred, if available.

3—Lumber shall be of sound material free from knots, knot holes, checks or splits which impair strength or interfere with proper nailing.

4—Lumber attached to car walls shall be nailed to studs with a sufficient number of nails of not less than 16d size to obtain ample security.

5—Uprights shown in the illustrations shall be beveled on the bottom to prevent catching on the car floor. Care must be exercised that nails attaching uprights to cross pieces are not driven through strapping.

6—Strapping shall be heavy-duty, 1¼ x .035, Type 1, in accordance with the requirements of Federal Specification QQ-S-781a. Hot rolled (not painted) strapping is preferred.

Avoid the Use of Waxed or Lubricated Strapping

7—It is important to use the correct size and quantity of strapping, seals, mechanical brakemen, staples, drive screws, special nails, etc.

8—Use two seals per strap, each seal *MUST* be double crimped.

9—Use two or more stretchers to obtain uniform tension on strapping.

Palletizing of Carload Shipments

The use of fork trucks and pallets in loading and unloading box cars will materially reduce the time required and thus shorten the "turn around" period for each car, effectively conserving critical transportation facilities.

Actual shipments have proven that a minimum reduction of sixty per cent in manhours required for loading and unloading can be expected. The Bureau has recently completed a series of tests in unloading palletized shipments in which a fork truck with one additional man in the car placing the "filled in" cases on pallets, unloaded palletized material at the rate of approximately ten tons per manhour after the car door was opened and the bridge plate in position. This figure applies to an average run of 200 feet each way to the storage point. Should additional fork trucks be used, the unloading time would be decreased proportionately. Compare this performance with a recorded unloading of similar shipments, not palletized, at an average rate of approximately three tons per manhour.

Figure 1 shows a suggested method for box car loading of a typical commodity on standard 48″ x 48″ pallets. The drawing does not set up rules for car loading; it merely shows how a particular commodity might be loaded. The arrangement of bracing, the loading plan at the car door and

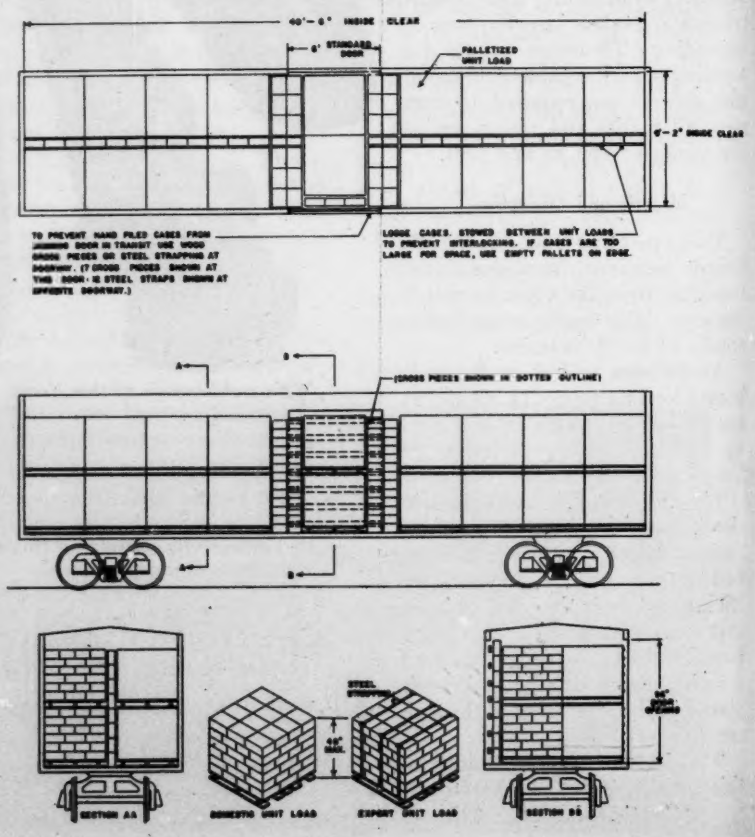
40'-0" INSIDE CLEAR
8' STANDARD DOOR
PALLETIZED UNIT LOAD
9'-2" INSIDE CLEAR
LOOSE CASES, STOWED BETWEEN UNIT LOADS TO PREVENT INTERLOCKING. IF CASES ARE TOO LARGE FOR SPACE, USE EMPTY PALLETS ON EDGE.
(CROSS PIECES SHOWN IN DOTTED OUTLINE)
STEEL STRAPPING
48" WIDE
DOMESTIC UNIT LOAD
EXPORT UNIT LOAD

Figure 1—Pallet unit load in box car.

WAR'S "SECRET WEAPON"

now available to industry . . . .

REPRINTED FROM THE
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May 6, 1945

too, were useless.

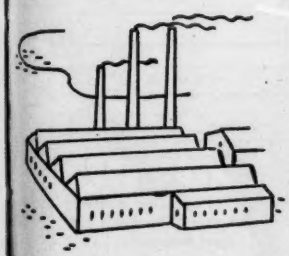
The Navy was faced with the acute problem, not only of expediting supplies to the Pacific but getting them there in condition to be used long after their arrival.

The important thing was to get the supplies there—faster. "Palletizing" solved this problem to a great extent. "Palletizing" has cut in half the man-hours of labor necessary to move material from the factories to the wharves, to the ships and to the battle fronts. The pallet upon which the methods of "palletizing" are based is a slotted platform or double-faced skid moved by metal "fingers" on special trucks. The principle in itself is not new, but the adaptation by the Navy in combination with highly improved fork-lift trucks and new techniques has made it possible to deliver speedily record-breaking quantities of material to the war fronts.

Know how "PALLETIZING" *solved the Navy Department's gigantic task of materials handling.*

Now, private industry can avail itself of the ingenious methods perfected by the experts called in by the Navy. In this respect, Pallet Sales Company proudly announces that **Curtis H. Barker, Jr.** *who was with the United States Navy as Technical Adviser of the Field Operations Branch has joined our organization.*

Many of America's largest plants are turning to Pallet Sales for an economical and speedy solution to their shipping and distribution problems. Your inquiry is invited. There is no obligation.



PALLET
sales company

122 *EAST 42nd STREET, NEW YORK, N. Y.*

the "filling in" between pallets will vary with each size of carton and weight of commodity.

With a larger size carton, "filling in" with loose cases might be impossible; in this case, empty pallets on edge may be used to fill the space between pallet loads. With a heavy commodity it may be necessary to reduce the load on the upper tier of pallets by one layer in order to keep the weight within the rated capacity of the car. Another method of reducing the loaded weight is to place only a single tier of pallets in the doorway and brace the upper tier of pallets in each end of the car. *The methods applied to a specific carloading problem will depend upon the judgment of the officer in charge.*

However, if the pallets are loaded through the doorway area, some form of doorway protection must be used in order to conform with recommended methods of the Association of American Railroads.

Such doorway protection may be either wood bracing or steel strapping. If the car has wood doorposts and wood bracing is used, it should be of 1" x 6" (minimum) hardwood nailed flush with car sides as shown in Figure 2. If the car has steel doorposts, the wood bracing should be as shown in Figure 3. In either case, the protection must be flush to avoid snagging the cases.

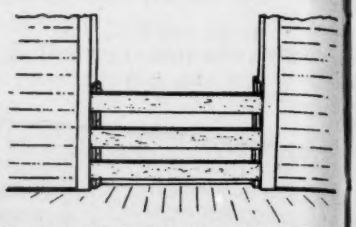


Fig. 2—Method of applying flush doorway protection for cars with wooden door posts.

If metal strapping is used, it should be ¾" x .020" (minimum), applied as shown in Figure 1.

Whichever method is used, each row of cases should be protected.

Bracing for Rail Shipment in Closed Cars

The material above shows a method of loading palletized units without internal car bracing—i.e., only car door protection is used. Such a car cannot be completely unloaded by mechanical equipment because some of the cases are not palletized.

If complete unloading by mechanical equipment is desired, then some form of bracing must be used in order to keep the doorway area free. A free doorway area is necessary in order for the fork truck operator to get his machine into the car.

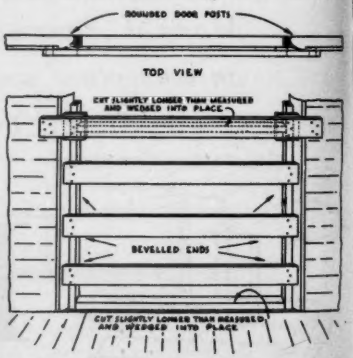

ROUNDED DOOR POSTS
TOP VIEW
CUT SLIGHTLY LONGER THAN MEASURED AND WEDGED INTO PLACE
BEVELLED ENDS
CUT SLIGHTLY LONGER THAN MEASURED AND WEDGED INTO PLACE

Fig. 3—Method of applying doorway protection to cars with steel thresholds and rounded steel doorposts.

The ANCHORED LOAD method is one way of keeping the door-

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SUPPORTS. An adjustable support for overhanging work on drill presses, shears, cut-off machines, punch presses, etc. Serves also as a feed table for many operations. Secure floor lock.

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LOADS AND UNLOADS. One man can do the work of many in loading and unloading freight. Especially convenient where shipments are delivered to curb or where docks are not available. Hydraulic operation assures ease and safety.

TIERS. An easily maneuvered truck, adaptable to tiering. Among other uses it serves as an adjustable work table for machining, assembly and general toolroom work.

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TABLE 1—STEEL STRAPPING SPECIFICATION FOR ANCHORING LOAD UNITS

Minimum Number and Size of Strap According to Weight

LOAD UNIT WEIGHT	SOLID LOAD		SHOCK ABSORBENT LOAD	
	1¼ x 35	¾ x 035	1¼ x 035	¾ x 35
5,000#	2 Straps	3 Straps	1 Strap	2 Straps
10,000#	3 Straps	5 Straps	2 Straps	4 Straps
15,000#	4 Straps	7 Straps	3 Straps	5 Straps
20,000#	5 Straps	Not	4 Straps	
25,000#	6 Straps	practical	5 Straps	See note
30,000#	7 Straps	to use	6 Straps	in 2nd
35,000#	9 Straps	¾" Strap	7 Straps	column
40,000#	10 Straps	in this	8 Straps	
45,000#	11 Straps	weight	9 Straps	
50,000#	12 Straps	range	10 Straps	

way area free and at the same time insuring safe delivery of the palletized units at destination. This method provides rigid bracing of the load by anchoring it to the car wall with either metal strapping or hardwood lumber.

METAL STRAPPING has been nailed to the car studding with anchor plates and the palletized units are ready for bracing. Table 1 shows the number and size of straps to use for loads of various weights. Read this table carefully.

A gate or bulkhead can be installed and the straps tensioned. This gate is constructed of 1" x 4" cross pieces which are so located that each cross piece touches two layers of cartons. The vertical members of the gate are 2" x 4" lumber with the center verticals placed on edge to provide a truss. This truss puts added pressure on the center of the load and maintains uniform compression along the entire face of the load. A toe blocking (2" x 4") is used at the foot of the center verticals.

Since there is more danger of shifting at the top of the load than at the bottom, extra straps are used on the top palletized units. The straps themselves are stapled to the gate so that they will not drop out of position even if they do loosen up in transit.

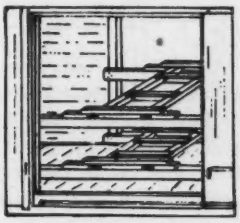

Figure 4.

WOOD BRACING for the same load is shown in Figure 4. All lumber used in this gate should be specified for 2" x 6" hardwood, free of knots and securely nailed. The bottom palletized units are toe blocked with 2" x 4" lumber as shown in Fig. 5. Make certain that the bracing across the doorway is

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nailed securely to the door posts because this bracing takes most of the strain when the load shifts.

The CONTROLLED FLOATING LOAD, sometimes called a "unit" load, is an alternative meth-

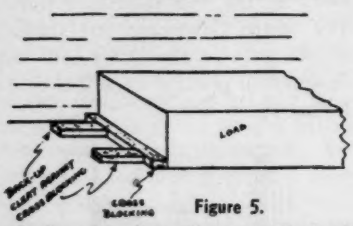


Figure 5.

od for bracing these palletized units. Two sections are formed, one in each end of the car, and allowed to shift under impact.

If such a load is used, the car floors and sides must be smooth and free of projections which might snag the pallets or the cases. Also, sufficient space must be left open at the doorway to allow the sections to move freely.

Each row of palletized units is bound together with two 1¼" x

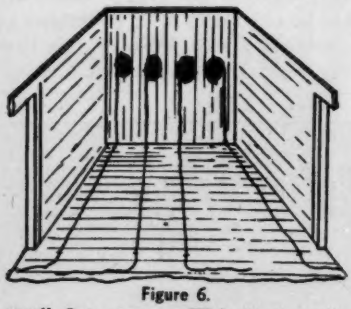


Figure 6.

.035" flat straps. This is done by draping the car as shown in Fig. 6, and threading one mechanical brakeman on each strap as shown in Fig. 7. These brakemen should be placed about half way between the door and the end of the car and securely nailed to the floor with 1-¾" drive screws.

The bottom two palletized units at both the back of the section and

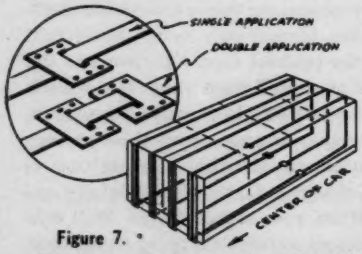


Figure 7.

at the front of the section should have their boards reinforced as shown in Fig. 8, at the point where

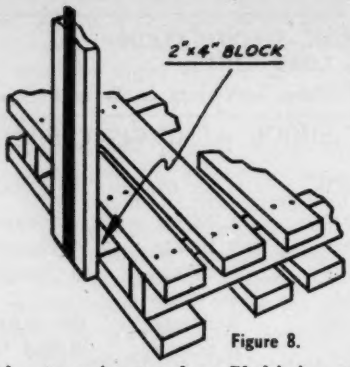


Figure 8.

the strapping touches. If this is not done, the strain of the strapping may break the bottom board of the pallet.

Just prior to loading the palletized units in the car, and after the car has been draped with strapping, some means of protecting the pallets from the strapping must be provided.

One method of doing this is to use a gate both at the back and at the front of the section. An alternative method is to use 1" x 6" verticals under each strap.

After loading of the palletized units is completed, the front gate or the verticals are installed and the strapping is brought over the top of the section, tensioned and sealed. The straps should be securely stapled to the vertical members.

WAREHOUSE LAYOUT PLANS

BEFORE stowing items in a building a plan of layout should be made, taking into consideration the types and quanti-

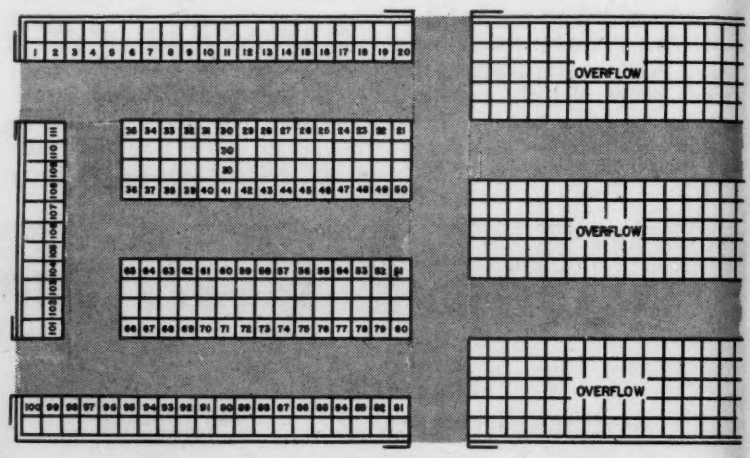


Figure 1.

ties of material to be stowed, volume of movement of each item, location of posts, windows, doors and elevators, selection of receiving and shipping bays, relation of floor load to items to be stowed, local safety and fire regulations. Aisles should be located where they afford efficient mechanical handling, replacement of stock and ease of issue.

It is necessary for individual activities to work out their own layouts in order that local conditions

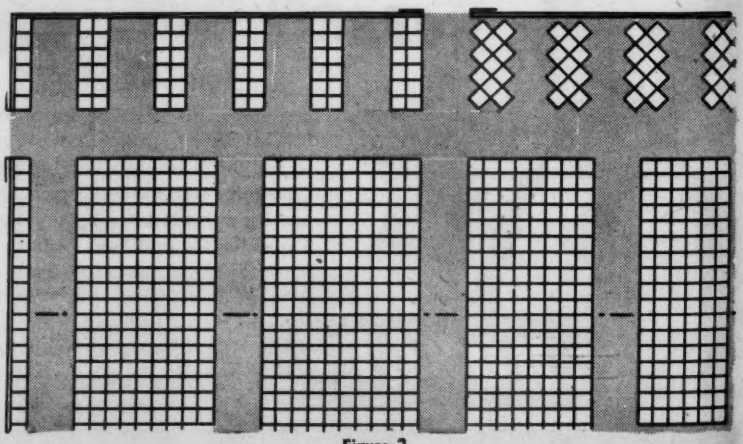


Figure 2.

and circumstances may be considered. However, two systems of palletized stowage are considered satisfactory, and all layouts may be made in accordance with their principles. Variations may be introduced, combining their features, or substituting 45° angle storage in place of 90° angle storage to combat obstructions, such as posts and pipes.

The *Consolidated Overflow Method* (Fig. 1) provides a representative aisle space for all catalog items carried, with a minimum stock reserve at that point. The bulk storage is combined in large areas of consolidated overflow, generally within the same building, or may be stored in separate buildings. Issues in quantity, of a particular item, are made from the overflow. Stock picking for filling requisitions is facilitated by concentrating the representative catalog area into as small a section of the warehouse as possible.

The squares in Figure 1 represent pallet spots, and the numbers indicate the method in which representative stock should be placed in numerical sequence according to catalog stock numbers. The pallet spots behind each numbered spot may be filled with type of material which moves fast. For example, the item of stock represented by No. 41 is slow moving, while that represented by No. 30 is material of which a number of issues are made daily. In order to maintain sufficient retail stock to carry through to the next period of replenishment, it is practical to stow

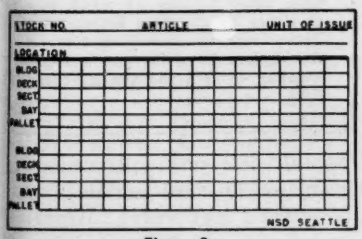


Figure 3.

item No. 30 in three spots as indicated.

It is necessary to have the representative stock replenished periodically by a responsible operator on a fork truck, either during the working day or after closing time.

This plan of storage is advantageous when issues must be made at night or on holidays, when the personnel familiar with stock location may not be on duty. Since the representative stock is stowed in catalog number sequence, any person knowing the stock number may follow the representative stock until the items required are found.

Location of respective overflow stock should be referenced by a card at the place of storage of each representative item.

This system embodies modifications of the Hicks System of storage which is in use by many activities throughout the Navy.

Stowage by Quantity (Figure 2) is by far the most adaptable and widely used of all systems. This method requires less warehousing to maintain, less paper work by the storekeeper, and it facilitates physical inventory by grouping of all items carried in stock in one place.

Items are stored by quantity. Sequence of stock numbers should be maintained insofar as possible. Items which are stocked in large quantities should be stowed in block storage, as indicated in the lower section of Fig. 2. Items which are stocked in small quantities should be stored in back-to-back stowage as illustrated in the upper part of Fig. 2.

The purpose is to effect maximum use of cube by pre-planned space allocation, based on average and reasonably anticipated stock levels.

Locator Cards similar to Fig. 3 may be kept by the storekeeper to show the location of any item. A perpetual inventory may also be maintained on the same card, contributing to organized warehousing. This system of storage is particularly adapted to warehousing classes of material where items vary widely in quantity and size.

DECEMBER						
S	M	T	W	T	F	S
..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	..	..	..	..	..

NEXT MONTH

A company manufactures and assembles many thousands of small parts into complex business machines. Our article on the handling operation presents the ingenious system developed for routing the myriads of parts from a central stockroom to scores of machining and assembly stations located in several multi-story buildings. . . . How is an internal transportation department organized? How are specific functions and schedules set up for the most efficient operation of an industrial truck fleet? A FLOW article in December will tell how a company engineered its in-plant transportations system, with many a useful pointer along the way. . . .

A company's method for handling a rubber product through numerous processing and finishing operations was designed to pre-position the work for each step in a series of operations. Some of the clever ideas may be adaptable to your plant. . . . Does the handling of the finished product in your order picking, packing and shipping department receive the same consideration as the material receives while moving from work station to work station during production? An article tells how a publishing company saved both dollars and valuable space by mechanizing its packing and shipping operations. . . . Handling methods in a smaller plant that are quite exceptional. The method for every operation—through receiving, production and shipping—was tailormade to suit the particular product and plant layout. . . . These are just some of the timely and stimulating features you will find in FLOW for December, on your desk the first week of the month.

TRUCK'S SPARE TIME JOB

During regular working hours this high-lift fork truck is used for

carrying, loading and stacking palletized loads, but during its "spare time" it is apt to be demonstrating its versatility on more unusual kinds of jobs. Here it is shown putting a safe, sturdy platform aloft for linemen installing floodlights to illuminate a loading area. Quick and dependable, the truck also saves times and effort on unusual spare time jobs of this kind.—*Courtesy, Clark Tructractor Co., Battle Creek, Michigan.*

they are to be stored for a particular length of time. On the average, approximately 50% of the finished material goes directly from production to loading operations. Permanent storage may be anywhere from one month to three months.

With a definite knowledge of what is coming, the warehouse foreman can lay plans for the most advantageous location for each particular item to be stored; that is, he can determine the *nearest* location to the point from which the products will be shipped (by truck or car).

The identification of individual packages of folding cartons (produced by the millions) is simplified by the use of labels of different colors to designate the different items on specific orders. For example, a blue label on the cases may identify a carton of a particular brand of soap for a given customer. A code number (in small print) on the labels tells the warehouse foreman the quantity to be run, and thus he is in a position to allocate the proper amount of warehouse space.

Because the loads are all palletized the entire warehousing operation is speeded up, with attendant savings. The trucks maneuver easily and quickly throughout the entire storage area, high stacking to save space. And no time is lost in picking off the exact pallet loads destined for a specific customer.

A Growing Fleet for Growing Needs

At present the company operates a fleet of 22 industrial power trucks —low-lift platform, high-lift platform, and tiering fork trucks. New equipment needs are constantly being studied and additional trucks are added after careful consideration of requirements.

Pallet and platform hand-lift trucks are used wherever possible in order to conserve power equipment, especially on very short hauls and where double decking is not necessary. Hand-lift trucks are also used extensively for positioning the work in process, as well as for numerous auxiliary functions.

Each production division operates its own industrial truck equipment for inter-division transportation—that is, from conversion to conversion operation. If, for example, a load of paper board is to go from the mill to the folding carton division, then the latter will pick it up. However, if the product is to be shipped to a customer, then the shipping department will move the load and handle it for outside shipping.

Car Loading

One of the photos shows the conveyor car loading system that has been developed in conjunction with fork trucks and pallets. Due to specific conditions existing, the type of goods to be loaded and the length of haul, short conveyor sections are employed to assist in loading cars. This method enables the trucks to place several pallet loads on the conveyor at the beginning of the loading operation, which permits the trucks to feed more cars along the 600-ft. loading dock.

Efficiency in loading time has been increased 20%. Incoming freight car loads of bagged chemicals are unloaded similarly in quick time.

The company is cognizant of the possibilities of shipping palletized loads by car and truck, but a number of problems (pertaining to customers and rail facilities) must be studied and solved. Meantime experiments are being made in order to determine the possibilities of shipping the goods in unit loads.

Costing

Detailed expense accounts are kept for the department covering direct labor, supplies, payroll, taxes, repairs, supervision, depreciation, real and personal taxes, insurance,

(Continued on page 44)

SEVEN HANDLING IDEAS

You may be able to use some of the hints, shown on page 43, which were developed by the Ohio Boxboard Co. These ideas are facilitating many of the big jobs, by saving time and contributing to safe and smooth operations.

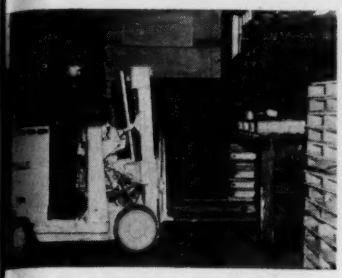
THIS BOX...AND SEVENTY
MORE...CAN BE CARRIED WITH SAFETY AND ECONOMY BY A SEMI-LIVE SKID
Superstructures designed and built for handling all types of unusual loads.
PROTECT EMPLOYEES
REDUCE WORKER FATIGUE
BUILD BETTER MORALE
Write For Bulletin 40
IRONBOUND BOX & LUMBER CO.
Materials - Handling Division
30 HOFFMAN PLACE
HILLSIDE, NEW JERSEY
SKID PLATFORMS
SEMI-LIVE SKIDS
FLOOR TRUCKS

Ed.:- This catalog weight help us- let's get one + see.

Seven Handling Ideas for Your Notebook

No. 1—Car Plate Rack

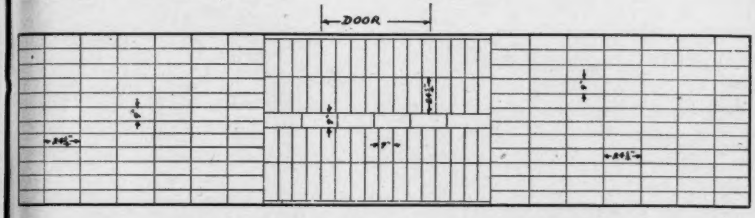
In the interest of good housekeeping and safety, all car plates are stored in a specially designed rack. This avoids having the plates scattered all over the shipping area and assures that they will be available when needed. Since the plates are



stored and moved by fork truck, as shown in the photo, the possibility of injury through manual handling is eliminated. Power handling also aids speedy car preparation.

No. 2—Blue Prints for Loading

Several years ago the company asked the consent of customers to establish standard car loads, with the following points as objectives: 1. Maximum tonnage per car. 2. Safe transport of products. 3. Efficiency in loading operations. 4. Level cars throughout. 5. Elimination of for-



eign blocking by loading the goods so that they would be self-blocking.

With the customer's consent obtained, the company then proceeded to experiment with numerous loading methods until the most advantageous one was developed for each type of shipment Blueprints were then made showing the specific loading method and quantity per car for each type of commodity. Customers and the sales department were supplied with copies.

A file of blueprints is also kept in a centralized location in the shipping department, where they are accessible to the loading crews for reference purposes. The "standard car" method made possible maximum utilization of rail facilities and the blueprints enable even inexperienced crews to load cars efficiently.

No. 3—Two-Way Haul

Maximum movement of inbound and outbound material is obtained with minimum trucking facilities by the two-way haul method and the use of a fifth-wheel type of tractor operating in the yard area.

All arriving trailers bring in raw material (baled waste paper) for the mill. Before entering the plant grounds, the driver stops for weighing at the watchman's gate. The watchman also makes note of the hauler, driver, and trailer number. This information is relayed by phone to the shipping planner.

The trailer load of raw material is taken to the unloading dock, where it is dropped at a designated door. The driver then proceeds with his tractor to the loading dock to pull a loaded trailer for outbound shipping, and he is on his way in minimum time.

Meanwhile the unloading department notifies the shipping planner when the recently arrived trailer will be empty and available for loading. The shipping planner in turn informs the company's tractor driver when to pick up the trailer and at which loading door to spot it. If the trailer is not scheduled for immediate departure after it is loaded, it is pulled away by the company's tractor to a temporary storage area on the grounds.

No. 4—Routing Waste Paper Bales

Considerable tonnage of waste paper generated in production must be moved daily from the baling department to the mill raw material sheds. The distance from the baler to these sheds is 2,000 feet, which would mean a travel of ¾ mile (4,000 feet) by industrial truck for each round trip. To move the numerous bales over this distance through the plant would tie up an industrial truck and operator the greater portion of each shift.

To avoid this, the bales are hauled by fork truck to a freight car loading door which is only 35 feet from the baler. The truck loads the bales in an empty car, which is later switched around to the raw material shed for unloading. In this way industrial truck equipment is conserved and maximum truck utilization and operator man-hour productivity are maintained.

No. 5—Palletized Loads of Work in Process

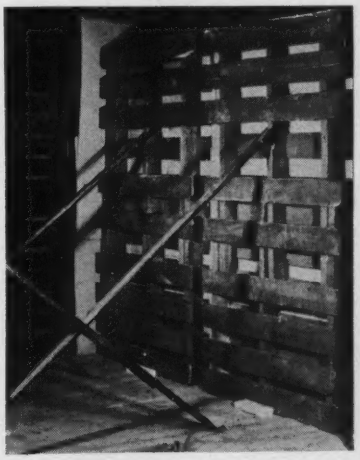
The accompanying photo illustrates the handling of palletized loads in a converting operation. This load of folding carton board has

been delivered off a press on the pallet and is now being positioned on a cutter. Between operations, such palletized loads are double decked, thus making use of overhead space in the production departments.

No. 6—Collapsible Bulkheads

Occasionally cars may not be completely loaded at the end of the last loading shift, and if the siding is switched the part-load in the car is likely to be distorted. This would necessitate unloading and reloading.

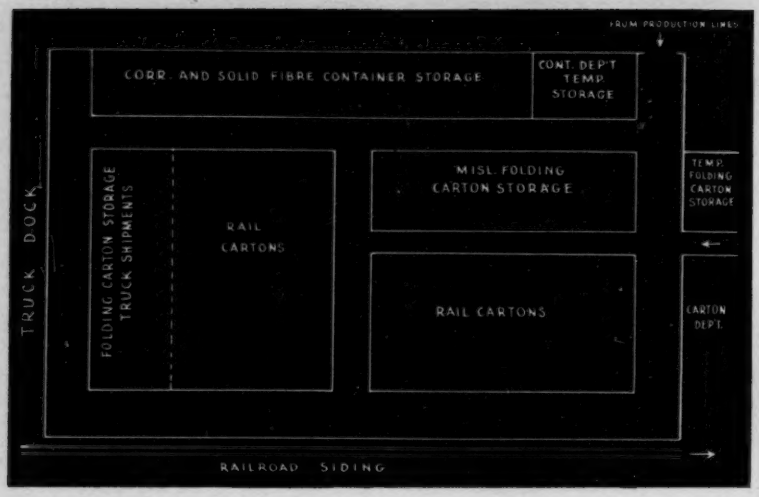
To prevent such waste of time and effort, a new type of collapsible bulkhead is used. This obviates having



large, prepared bulkheads lying around and makes for easier handling in the shipping area. The small collapsible sections are readily set up and adjusted by one worker. Also, the compact bulkhead sections are easily stored out of the way.

No. 7—Pallet Repairs

Loading crews are instructed not to return any damaged pallets to the production lines, but to segregate them and take them to a designated area. From here they are moved to the carpenter shop in lots of not more than 15. Observance of this rule provides sound pallets for all operations, keeps at a minimum the number of pallets that are out of circulation at any given time.



Layout sketch of the centrally located warehouse. Temporary storage areas are shown at right.

etc. For report purposes, these expenses are segregated as to fixed and variable charges.

For purposes of reporting time and expense, charge numbers are assigned to each item of expense, and sub-numbers are used where greater detail is required. For example: The shipping department is represented by 1,500, labor by 1, folding cartons by 2. Thus, the number 1,501-2 would represent direct labor in handling folding cartons chargeable to the shipping department.

Budgetary control procedures are in effect, wherein a flexible budget is set up for the variable items of expense and a fixed budget determined for all fixed charges. Actual costs are compared with budgeted costs monthly.

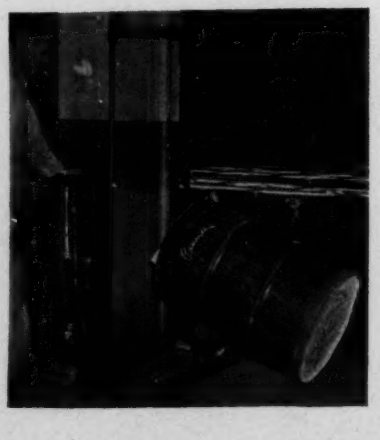
Each superintendent is supplied with a summary of the operational cost of his particular division or department at the end of each month. If a certain departmental operation is over the budget, the supervisor checks into the situation to see what remedies can be applied.

Why the Program Works

The present system has not only enabled the company to handle the stepped up volume during the war years, but the even greater loads at present with equal facility. The program works, not because of any one individual or department, but because all departmental supervisors have contributed their ideas to it. Management, sales, production, and all service departments have been helpful. And their daily cooperation is helping to make it a practical one that is paying the company dividends in terms of maximum utilization of space and low-cost handling.

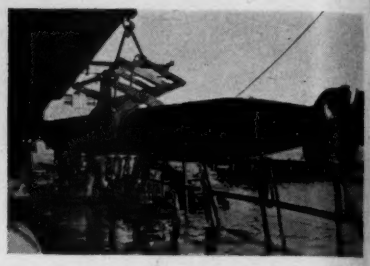
IT'S DONE WITH A FLIP

AT THE Sherwin Williams Company's Cleveland plant, compressed air is put to work in eliminating back-breaking lifting tasks. Shown is a paint drum lift, installed on the company's unloading dock where barrels of paint are rolled off trucks. Barrels weighing from 700 to 1,000 lbs. each are easily up-ended by compressed air power as shown in the photo. Before the installation of this lift, two or three men strained to set each drum on end. Now the job is done with a flip of a lever.

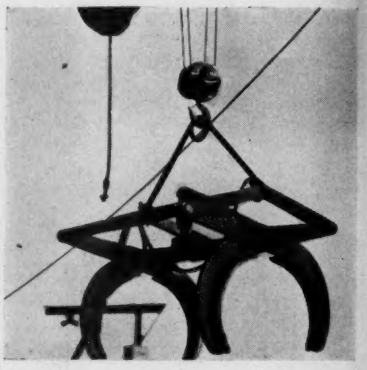


TONGS CATCH THE TIN FISH

IN ORDER to obtain performance data on their fitness for war duty, the Navy fires many torpedoes which are filled with water instead of explosives. Since the water is expelled at the end of the exercise run, the torpedo floats in a vertical position with 9/10 of its body submerged. The spent missiles are retrieved by a boat.



A hoisting strap was first used to haul the "fish" in a vertical position up to a dock. It seemed



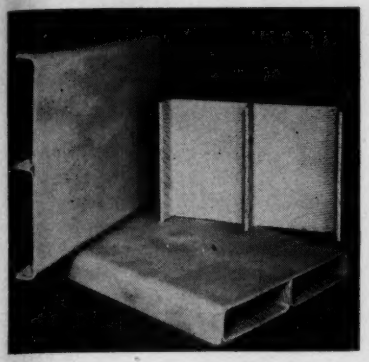
reasonable that the torpedoes might be picked up by tongs and lifted horizontally. The problem was solved with the tongs shown.

The tongs are suspended on a hook running down from a power hoist. The vertically floating torpedoes are first raised to a horizontal position in the water by means of a tail strap. When the lifting device is lowered upon the torpedo, the action automatically unlocks the tongs. The large contact areas engage and grip the burden when the power hoist starts to lift. The torpedo is then hauled up and lowered on the small cradle truck shown. Upon further lowering of the tongs, a locking device engages and holds the jaws in an open position. This completes the cycle, and the tongs are ready for another "fish."—*Courtesy of The Heppenstall Company.*

PAPER PALLETS

HERE are three views of the impregnated paper pallet, recently announced by Old King Cole, Inc., Canton, Ohio, which is said to be designed as a one "through trip" pallet. It is intended to be discarded at its final break-up point just as a carton is discarded when it has served its purpose.

According to the manufacturer, the load would be palletized at the end of the producer's line and carried through his warehousing and carloading operations. The unit



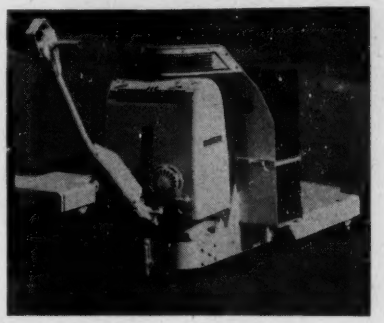
would remain intact when unloaded by the receiver, also in his warehousing, and possibly through reshipment to the final destination.

A 48 x 48 single face pallet will bear two tons in transit, it is claimed, or a static load of 10,000 lbs. A 48 x 48 double face pallet (3-ply construction) will carry 5,000 lbs. in transit, or 15,000 lbs. static.

Since the one "through trip" pallet is designed to be discarded by the receiver, segregating, identifying, storing and returning of the pallets are eliminated, states the company.

PRECISION SPOTTING

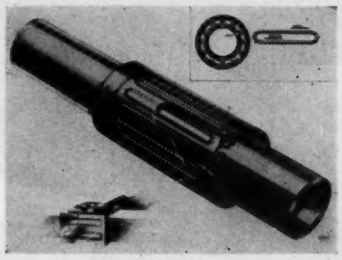
ELECTRIC hand lift trucks like this one helped move material for the atomic bombs at the project of the Manhattan Engineer District, according to a recent announcement by the Automatic Transportation Company. Note the arrow-pointer on the front, bottom frame, which enabled the operators to spot the heaviest loads with absolute accuracy in a predetermined layout. This idea may be of value in other operations where precision spotting is a consideration. Several hundred of these powered hand trucks were used in



the atomic bomb project to speed production.

BALL BUSHING

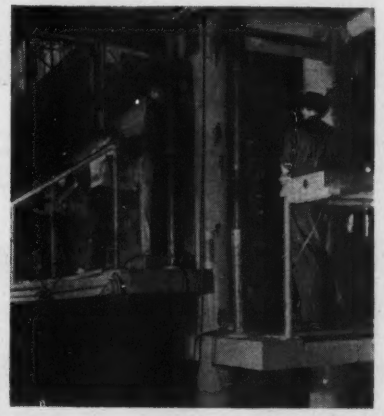
Thriftmaster Products Division of Thomson Industries, Inc., Long Island City, announces the development of a ball bushing, permitting unlimited travel of reciprocating mechanical members. The advantages in the use of ball bearings for rotating parts can thus be obtained on sliding members. The



bushing contains within itself a series of ball circuits; one side of the circuit carries the bearing load with the other side returning the balls in a clearance provided in the outer race member of the bushing. It is said that this continuous bearing prevents cocking or binding on the shaft because the bearing balls remain constantly centered under load. Bearings of considerable length or of a square, hexagon or octagonal section are available.

POSITIONING THE WORKERS

IF YOU are assembling or machining unusually large and heavy pieces, this wartime handling method may be of value. Instead of moving large sections of airplane wings to position them for operators, the American Central Manufacturing Company, Connersville, Indiana, built lift platforms which positioned the workers. This made possible speedy assembling and ma-



chining operations with minimum handling of the bulky and heavy pieces. The photo shows two of the electrically operated lift platforms used.

WANTED

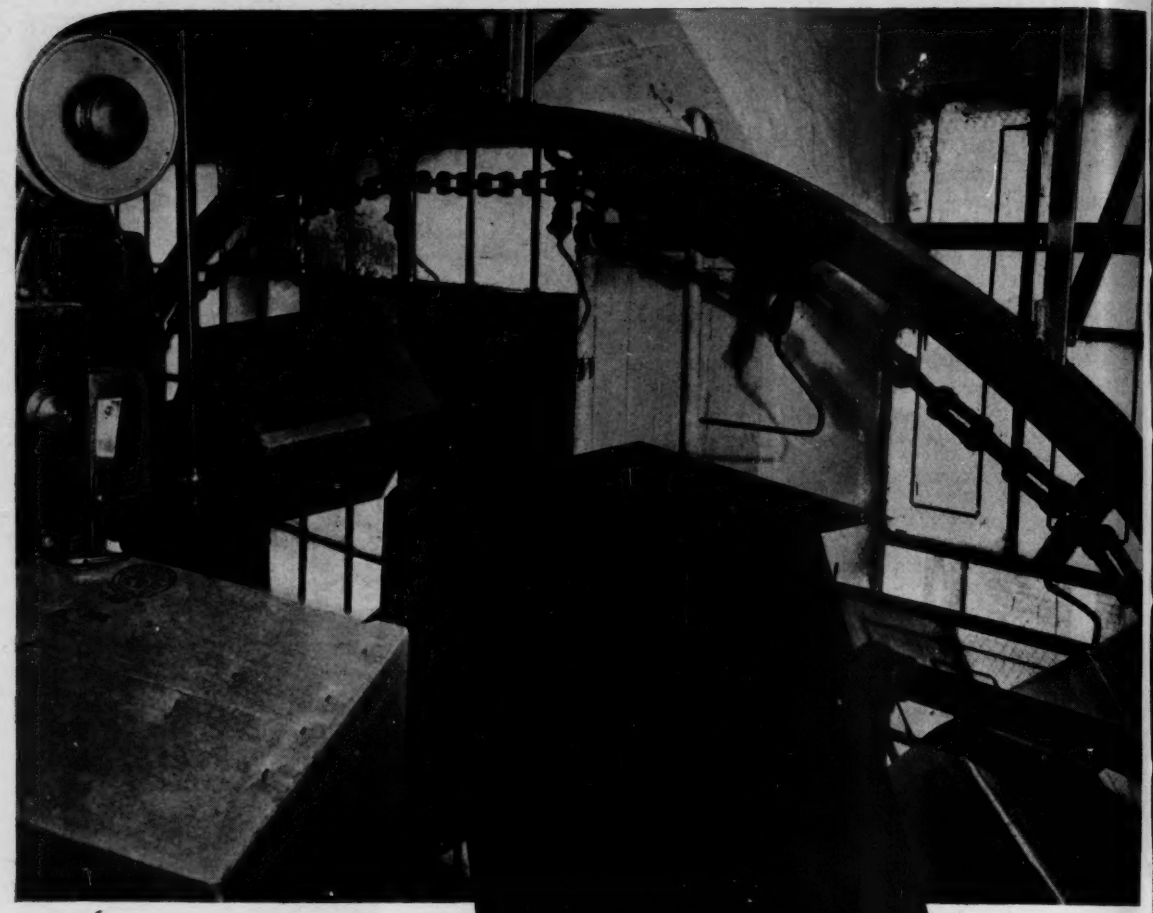
We are looking for a young industrial engineer with material handling experience. His background may include some promotional or advertising writing.

To the proper man we are prepared to make a proposition which will be immediately interesting and of long-range importance. Please send all pertinent data in first letter with recent photo, if available.

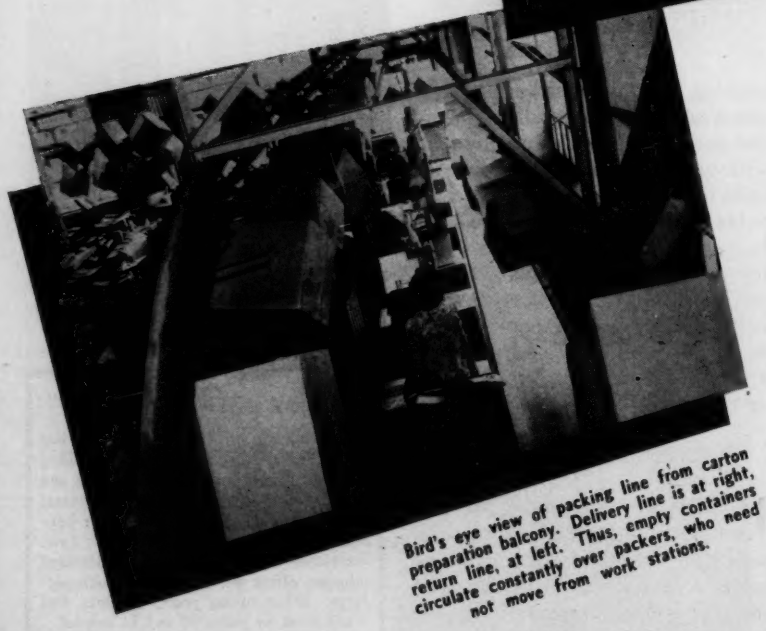
Address Box F16
FLOW MAGAZINE
812 Huron Rd.
Cleveland 15, Ohio

HANDY WITH A CAMERA?

Read FLOW's offer (page 30) to buy photos illustrating up-to-date handling methods. These may include "before and after" scenes of improvements, unusual devices or methods, or "tricks" that have proved particularly efficient in your case. Practically any plant with a modernized program offers possibilities for such pictures. When taking yours, you may find the hints on pages 30 and 31 helpful.



Above, loading point in balcony for set up cartons. Note hooks, specially designed for easy loading and removal of cartons. Machine, left, stitches bottoms of containers.



Bird's eye view of packing line from carton preparation balcony. Delivery line is at right, return line, at left. Thus, empty containers circulate constantly over packers, who need not move from work stations.

WHEN the outgoing volume of automotive engine and chassis parts was mounting steadily several years ago, manual packing eventually was found inadequate at Thompson Products, Inc. At the time, the department's daily capacity was *limited* to about 35,000 pounds with four men packers. They had to carry empty cartons some distance from the stock pile and perform other incidental jobs, which tended to reduce the number of outgoing packages.

Today, nine girl operators are packing alongside a belt line, with empty cartons being supplied them in a continuous stream by an overhead conveyor. As a result, the department's daily capacity has increased to 120,000 pounds and, on one occasion, produced a peak volume of 152,000 pounds in one eight-hour shift. Mechanical handling

View along packing line, with the floating supply of empty cartons above. Girls dispose of full cartons by simply sliding them on moving belt conveyor—a speedy and easy operation.

By increasing the department's capacity over 300%, this overhead conveyor helped cut packing costs 50%. An overhead monorail chain type conveyor was adapted to packing line operations at Thomson Products Inc., Cleveland, O.

The overhead conveyor is a closed circuit 350 feet long and straddles the belt line and packers stationed to its left side. If a girl misses a carton of a particular size moving past her on the delivery line, she can "catch" it on the return line. The corrugated containers are simply hung over hooked rods that are attached to the conveyor chain at intervals of two feet. Time studies have shown that it takes a girl only a few seconds to remove a carton from a hook, as compared with ¾ of a minute it required a man to get a carton from the stock pile.

The empty boxes are fed on the conveyor by a girl stationed on a balcony, which is situated at the head of the line. This operator works beside an ample stock of knock-down cartons. She opens them, stitches the bottom, and hangs them on the empty rods that pass her station at the rate of 60 aids not only set a new pace, but also facilitated the operation so that girl packers could perform it without undue fatigue. The average daily output amounts to about 1650 cartons, shipped to 50 branches and 3,000 accounts.

Weighing station on gravity roller conveyor. Since lifting is eliminated, girl operator handles even heavy cartons with ease.

The Modern Way

The packers are spaced about eight feet apart and fill shipping cartons with packaged engine and chassis parts from shelf trucks that are placed near them. The shelf trucks arrive by elevator from the second-floor stock room. Unless a large shipment is involved, stock pickers load one shipment on each shelf. With empty cartons being delivered constantly to the point of use from overhead, the packing operation continues without interruption.

High Road to PACKING ECONOMY

Above, loading point in balcony for set up cartons. Note hooks, specially designed for easy loading and removal of cartons. Machine, left, stitches bottoms of containers.

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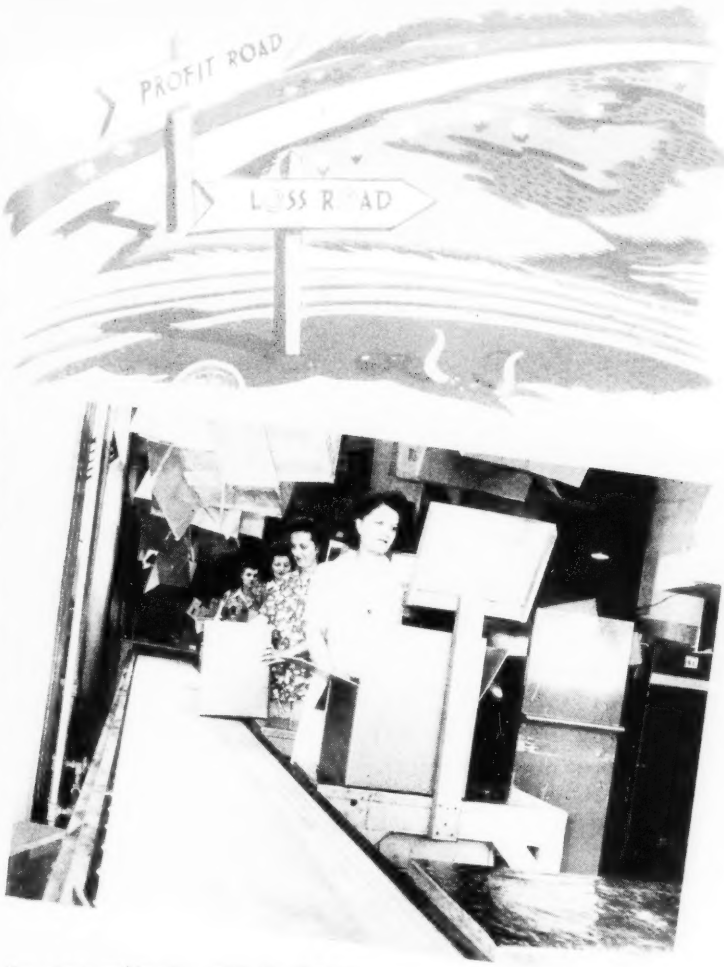
WHEN the outgoing volume of automotive engine and chassis parts was mounting steadily several years ago, manual packing eventually was found inadequate at Thompson Products, Inc. At the time, the department's daily capacity was *limited* to about 35,000 pounds with four men packers. They had to carry empty cartons some distance from the stock pile and perform other incidental jobs, which tended to reduce the number of outgoing packages.

Today, nine girl operators are packing alongside a belt line, with empty cartons being supplied them in a continuous stream by an overhead conveyor. As a result, the department's daily capacity has increased to 120,000 pounds and, on one occasion, produced a peak volume of 152,000 pounds in one eight-hour shift. Mechanical handling



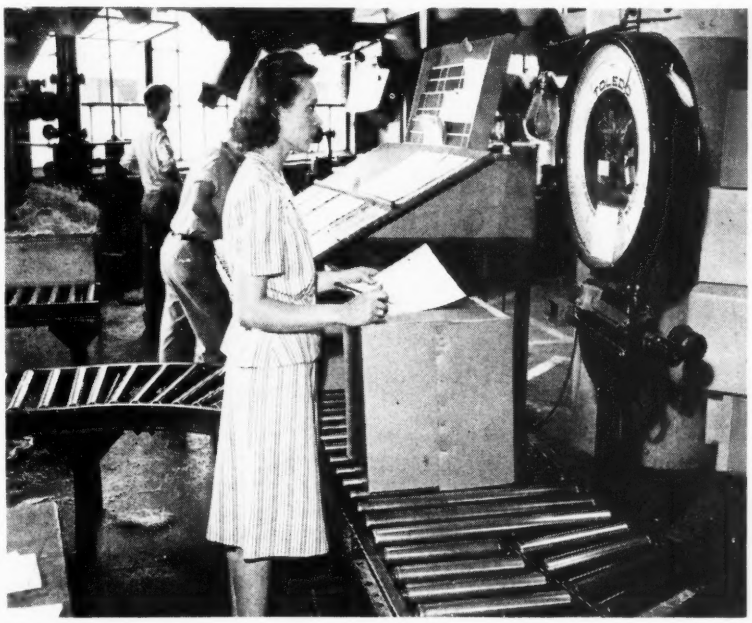
View along packing line, with the floating supply of empty cartons above. Girls dispose of full cartons by simply sliding them on moving belt conveyor—a speedy and easy operation.

By increasing the department's capacity over 300%, this overhead conveyor helped cut packing costs 50%. An overhead monorail chain type conveyor was adapted to packing line operations at Thomson Products Inc., Cleveland, O.

The overhead conveyor is a closed circuit 350 feet long and straddles the belt line and packers stationed to its left side. If a girl misses a carton of a particular size moving past her on the delivery line, she can "catch" it on the return line. The corrugated containers are simply hung over hooked rods that are attached to the conveyor chain at intervals of two feet. Time studies have shown that it takes a girl only a few seconds to remove a carton from a hook, as compared with ⅓ of a minute it required a man to get a carton from the stock pile.

The empty boxes are fed on the conveyor by a girl stationed on a balcony, which is situated at the head of the line. This operator works beside an ample stock of knock-down cartons. She opens them, stitches the bottom, and hangs them on the empty rods that pass her station at the rate of 60

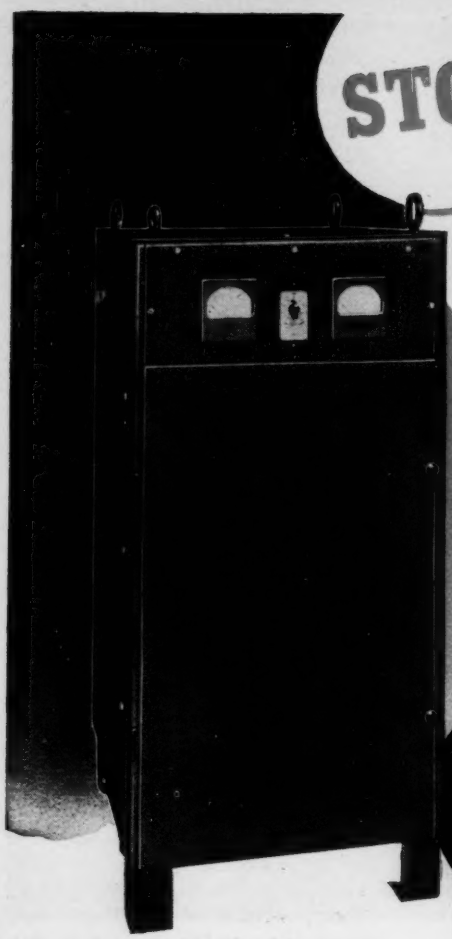
Weighing station on gravity roller conveyor. Since lifting is eliminated, girl operator handles even heavy cartons with ease.



aids not only set a new pace, but also facilitated the operation so that girl packers could perform it without undue fatigue. The average daily output amounts to about 1650 cartons, shipped to 50 branches and 3,000 accounts.

The Modern Way

The packers are spaced about eight feet apart and fill shipping cartons with packaged engine and chassis parts from shelf trucks that are placed near them. The shelf trucks arrive by elevator from the second-floor stock room. Unless a large shipment is involved, stock pickers load one shipment on each shelf. With empty cartons being delivered constantly to the point of use from overhead, the packing operation continues without interruption.



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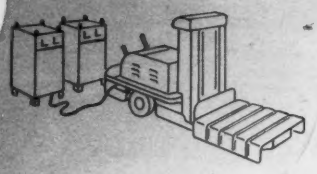

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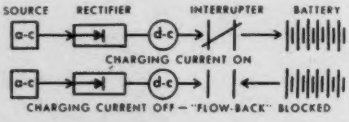

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FLOW

feet a minute. ("Mechanically Speaking" at the end of this article gives details of installation.)

Moving Out Full Cartons

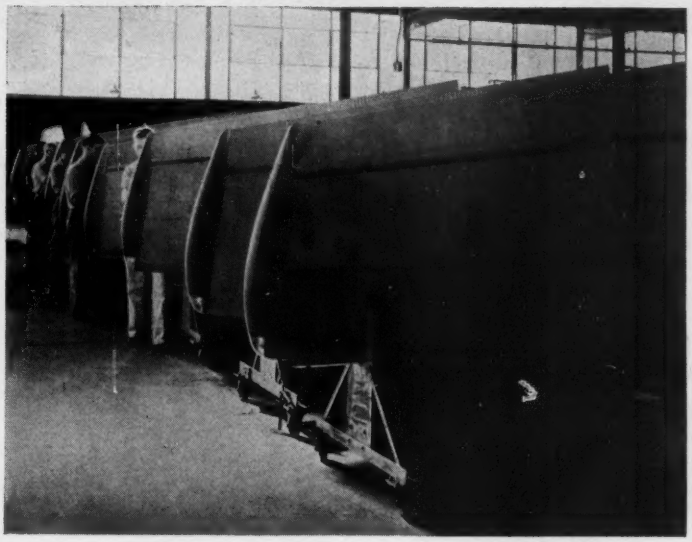
Full cartons are slid off the packing tables onto the belt line, eliminating lifting. The belt takes the boxes to a section of roller conveyor, where other specialized functions prepare the containers for the adjoining shipping room. At the head of this section one worker stuffs excelsior into the boxes. The next station is the stitcher operator, who stitches the tops. From here the boxes roll forward to the weighing platform. This, of course, is a section of the conveyor on the same level with the other rollers. Hence, lifting is also eliminated at this point.

Two narrower sections of rollers, connected by a frog, take the containers to the shipping room. Here four-wheel hand trucks are placed according to destination and shipping requirements. There is a truck for each classification. Thus the cartons are dispatched to the nearby loading dock in sizable units which can be loaded on trucks and trailers without further handling.

The Old Way

A brief glance back at manual packing of several years ago provides an illuminating contrast to the smooth, speedy operation now in use. Several years ago each of the four packers worked at his table which was set up in a corner of the department. In the center of the space, about 12 feet from each worker, stood a pair of scales. When a man had run out of empty cartons he had to walk 60 or 70 feet to the stock pile to get three or four more, then carry them to his table. The packer had to open each carton, tape the bottom, pack the merchandise, add the excelsior and tape the top.

At the end of the line, cartons are conveniently sorted according to shipping carrier.



LONG and heavy wing assemblies are moved about with ease by use of specially designed cradles mounted on casters. Mobility of these carriers helped maintain production schedules. Note rod (second cradle from front) which locks carrier into position on floor.

Then came weighing, which meant carrying the full containers to the scales and back to the work station. If three or four cartons belonged to one shipment, the packer usually left the first one on the scale platform until he had brought over the remaining ones. This kept the other three packers waiting and reduced the departmental output.

A hand truck stood between each of two packers. On it went the various full containers—for California, New York, Florida and other sections of the country. When the loaded trucks were wheeled out to the shipping platform, the mixed cartons had to be picked over to separate them into postal zones and the various shipping requirements.

And Today

The sizable increase in departmental capacity was brought about by the elimination of cumbersome manual operations and specialization of functions, both made possible by the conveyor system. Whereas packers formerly did a half dozen related jobs, today they fill cartons *only*. Stitching, feeding, stuffing excelsior, and weighing are done by specific workers in the line, and the corrugated boxes roll off the conveyor in sufficient quantity so that they can be stacked on hand trucks in uniform loads having the same shipping requirements. Thus, the mechanized packing line is also contributing to efficient handling in the loading operation.

These details explain the considerable reduction in the packing cost—and why the installation paid for itself *in seven months!*

Mechanically Speaking

The balcony was designed and built as an integral part of this system. By providing space for the storage of knock-down cartons and the setting-up operation, advantage was taken of air space which otherwise would have been wasted.

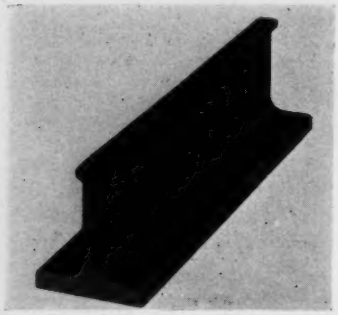
The take-up end of the overhead conveyor was especially designed to route only the loading line over the balcony in order to conserve mezzanine space. The take-up mechanism is located under the balcony floor where it is readily accessible for maintenance attention.

The hooks are very simple. After experimenting with more complicated types of carriers, it was found that simple bent hooks having a throat approximately 18" long were ideally suited for loading, carrying and unloading the cartons. This conveyor also has variable speeds so it can be geared to various production paces.

Running off of the main gravity roller line is a U-shaped spur section over which special jobs are routed to eliminate congestion.

TRAMRAIL SYSTEM

THE Forker Corporation, Cleveland, announces the development of the Ohio Tramrail System,



consisting of several one-piece rolled steel tramrail sections of simple design and heavy construction, said to be suitable for various span and load conditions.

Trolleys are available both for chain and electric hoists, and the system includes monorail switches, cranes and below-the-hook devices. Said to be completely new is "Shielded Electrification," which brings power to trolleys and cranes with live conductor bars covered against contact by workmen.

CONVEYING UNIT

THE Island Equipment Corporation, New York City, announces a small powered belt conveyor unit, in 10′, 5′ and 3′ lengths. These units can be coupled together to make as long a conveyor system as may be wanted. Due to their short lengths, they can be arranged to form any shape, the manufacturer states, and will convey on the level, up or down grade. Two sections will make a 30° turn, three sections one of 60°, and four sections a 90° turn.

The speed of all units is synchronized as though it were one unit, according to the manufacturer. An entire assembled system, he states, can be instantaneously controlled from the unloading end by positive push-button control. The system can be quickly lengthened or shortened according to need, without special wiring. The belts come in three widths—12″, 16″ and 20″.

HAND TRUCKS

AIRPLANE fabrication techniques are being used in constructing hand trucks by Northrop Gaines, Inc., subsidiary of Northrop Aircraft, Inc., Hawthorne, California, according to a recent release. This model comes in three sizes and has a frame cast in one solid piece of aluminum. The

smallest model, weighing 36 lbs., has been stress-tested under a 5,000-lb. load, it is claimed. The accompanying photo shows a 5,330-lb. load of aluminum ingots stacked on one of these trucks.

They are the type used in railroad stations, steamship offices, hotels and warehouses. Large-size trucks are equipped with special clips on the side bars, designed to prevent barrels from rolling off.

Airplane fabricating techniques are also said to be used in the manufacture of the company's light-metal industrial wheels. These are cast solidly of aluminum and have hard rubber tires molded firmly on them by a process which is said to be new, it is stated. These wheels,

now being built in 6″, 8″, 10″, and 12″ diameters, are designed for use on hand trucks, dollies, and all rollable industrial equipment.

DOLLIES

TECHTMAN Industries, Inc., Milwaukee, announces the patented development of "Skid-Rol" Dollies, designed as movers of such heavy pieces as machines, tanks, boxes, steel blocks, dies, furnaces,

etc. These loads may weigh from 10 to 12 tons each. Safe movement is assured, states the manufacturer, because the loads are carried only a few inches from the floor, eliminating hazards.

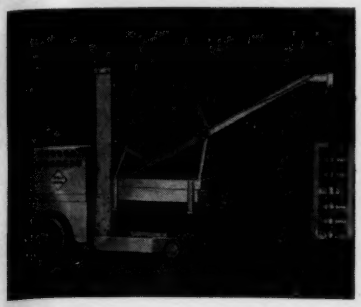
The dollies are designed to be used in pairs, with the load placed centrally over them. When inverted, "Skid-Rols" can be used for a standing dolly for moving steel beams, girders, etc.

LIFT TRUCK BOOM ATTACHMENT

A SIMPLE boom attachment enables a machine tool builder to use a high-lift platform truck for a wide range of intermediary transportation jobs, announces the Elwell-Parker Electric Company, Cleveland.

Many castings and parts for machine tools are of a size or shape not readily handled on skids or in skid boxes. The machine tool company adapts its platform trucks

to these loads by means of a detachable boom built from steel angles and rods as shown in the photo. The attachment can be ap-



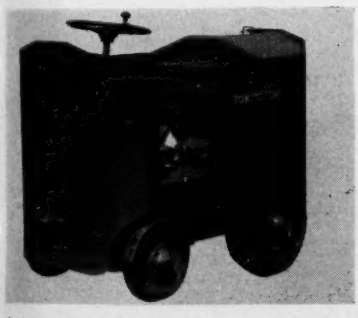
plied or removed in a few minutes. The improvised boom has already saved many times its cost in time and manpower, according to reports.

The Elwell-Parker Co. builds a detachable boom for use with its trucks, which have a separate motor for elevating and lowering the load by means of a cable. The lead from this motor can be plugged into the truck's regular battery.

RESUMES TRACTOR PRODUCTION

GASOLINE-POWERED tractors are once again rolling off the assembly lines in the Towmotor Corporation plant at Cleveland, according to an announcement by the company. Production of these units, built since 1919, was halted in 1941 to allow the company to concentrate on the manufacture of lift trucks.

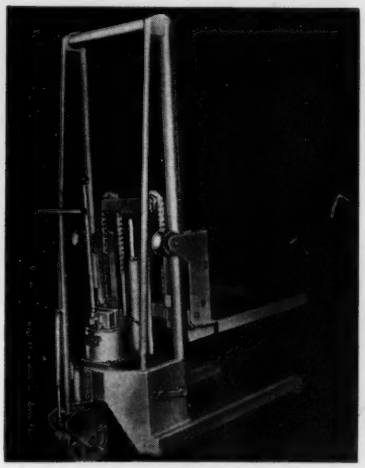
The new model tractor, pictured



here, is said to have several design and construction features. According to the company, the tractor is especially suited for working in such confined areas as in narrow factory aisles, up ship gangplanks and in and out of railway cars. The new unit also embodies many safety features, it is stated.

HYDRAULIC HIGH-LIFT TRUCK

THE Lyon-Raymond Corporation, Greene, N. Y. announces a new 2000-lb. capacity Hydraulic High-Lift Truck. The same light-



weight welded tubular and formed plate construction is used as in the 1,000-lb. capacity unit. The light weight of the truck is said to make it suitable for transferring materials as well as for stacking and tiering.

The manufacturer supplies the following construction data. The standard stock model has a platform 30" wide by 36" long with an elevating range from 6" to 60" above the floor. A foot-operated floor lock, making two-point contact with the floor, will hold the truck in position when desired. A two-speed hydraulic hand pump, illustrated, is standard equipment, or a motor-driven hydraulic pump may be furnished.

STEEL DRUM OPENING TOOL

Merrill Brothers, New York City, announce the "O'Brien Drum Opening Tool."

It is described as a powerful, fast cutting tool, operating on somewhat the same basic principle as the familiar can opener.

With it, the top of a steel barrel or other metal containers can be cut away with the ease that a housewife removes the top of a food can.

It is made of a steel drop forging, 23½" long, weighing 5½ lbs.

"RULES OF THE ROAD"

THE training of in-plant truck operators is a vitally important consideration at any time; it is especially important where scores of trucks transport considerable tonnage through plant aisles. To provide maximum safety conditions, the Glenn L. Martin Company, Baltimore, has devised a thorough training program for the operators of its 80 industrial trucks which travel approximately 1,000,000 miles a year.

Two of the company's "rules of the road" are illustrated in the accompanying photos. Figure 1:

Figure 1.

Trucks must come to a complete stop at all main intersections controlled by signs. Areas before office doors, like the one shown, are designated "safety zones", where operators must exercise special precautions. Note the large "STOP" signs, also the painted lines mark-

Figure 2.

ing off aisle spaces. Figure 2: It illustrates the "*keep to the right*" rule—both for trucks and pedestrians. The sign appearing at the right reminds operators that they must "slow down at all intersections".

All operators must be thoroughly conversant with the company's 33 "rules of the road", published in a manual for inside transportation operators. Following an intensive period of training and examination.

XUM

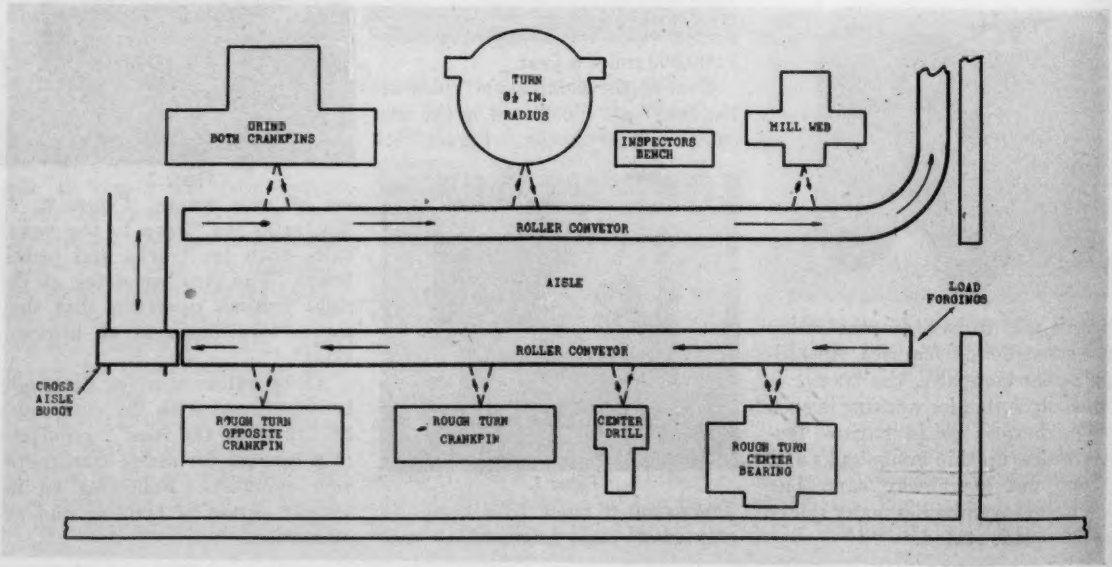
High precision parts which are assembled and reassembled a number of times during fabrication must be handled gently. When volume manufacture is involved, material handling problems are introduced. Here's the Ohio Crankshaft Company's answer. The equipment set the pace for the precision work, reduced supervisory time.

HOW to increase production and maintain a quality product presented a problem in flow and in material handling at the Ohio Crankshaft Company. Plant No. 4 was engaged in the precision grinding of parts and assemblies. As production increased elsewhere in the other three plants, demands on the plant for turning out additional precision work made a study of material handling and flow imperative. After an analysis the answer was found in the installation described here.

The five parts of the crankshaft assembly came to the plant in a semi-finished condition. Considerable money, time, and labor had already been put into these parts in forging and machining. They consisted of (1) a front or shaft section (2) center or crank pin section, (3) a rear or hub assembly and (4) and (5) two counterweights.

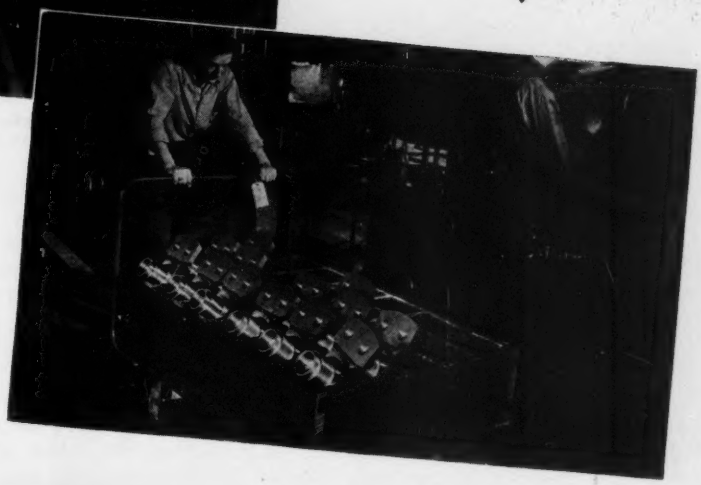
Since these parts were assembled

Diagram below shows only one section of grinding department that comprised 120 work stations.



THE OLD—These photos illustrate the old method, which involved much rehandling and did not provide proper protection for the high precision parts.

Below—Handlers moved delicate assemblies between work stations on this type of hand truck, equipped with sectionalized deck. See article for details.



and disassembled five times in the flow of work through the shop, the handling problem required a most careful study. The slightest nick or scratch would cause rework, or more often scraping of these semi-finished parts, which were extremely costly to produce. Extraordinary care had to be allowed for in whatever method of handling and positioning of these pieces would be adopted. The weight of the complete assembly was 135 lbs. The weight of the front section was 52 lbs. The weight of the rear section was 46 lbs.

There were approximately 70 machining operations for each piece or assembly. This meant handling these heavy pieces and assemblies some 70 times, in addition to the handling in transporting from work station to station. Add to this various inspection stations—and you arrive at up to 120 separate sta-

THE NEW—Gravity roller conveyor and hoists provided smooth flow of work through internal grinder line—helped set pace for precision grinding operation.

Lower photo shows work being transferred from conveyor to machine by hand-propelled overhead electric hoist. This handling avoided damage to parts.

Movement of shaft assemblies on conveyor. Note "dolly" used for assembly, which serves as carrier and "fixture." When shaft is placed on dolly, the shaft can be rotated on its axis and swung radially as well.

tions in which handlings of one to five pieces are involved!

Under the old method hand trucks were used. These trucks carried the parts and sub-assemblies in lots. Specially designed, built-in racks were designed to carry the parts or sub-assemblies in a fixed position so as to avoid scratches or nicks. But they were but little above the floor level, and required the worker to stoop to pick up the desired part. When fully loaded, they were heavy and hard to move. To move a fully loaded truck from the storeroom and work-station to work-station was a back breaking job.

To complicate matters, as parts for each assembly left the storeroom, they were assembled immediately. These five parts were immediately identified and stamped with the assembly number. After disassembly, the element of search became a delaying factor in subsequent operations. The machine operator was abliged to examine several pieces in the truck to locate the correct pieces for assembly after disassembly, and this same search had to be frequently repeated. Wrong pieces were assembled and machined, resulting in scrap of the entire assembly. Since the complete crankshaft assembly is machined as a unit on the grinder, it was a "must" that in subsequent operations these same parts be properly identified.

When the proper pieces in assemblies had been located, it was a delicate operation to put these heavy pieces into the machines without nicking or scratching. At some of the work stations it required two men to lift and transport and position the work. At one of the work stations, a boring machine for boring alignment holes, delicate positioning was required, since the work rested in a fixture and the shaft locked in before machining. Getting the work in or out of this fixture without scratching or nicking required two men exercising utmost care.

This careful handling, though necessary, retarded the flow of work in process. This, and the trucking of heavy parts from work-station to work-station, resulted in too much waiting time by machine operators for material to be brought to them.

When the analysis was begun, it was discovered that the material handling department and the stores department were not working in complete cooperation. The proper method of piling, separation of lots, and handling of goods in storage, as well as storage equipment, were not coordinated in handling materials.

The New Program

The start was made here. Semi-finished parts for crankshafts are brought in on suitable live skids from the other plants. The auto truck drives into the plant in an aisle next to the storeroom. Here a hydraulic platform lift is installed which is beneath metal doors at floor level when not in use. When the lift is elevated to the height of the truck, the live skids are pushed onto the lift platform which then lowers them to the floor level. Here the skids are removed and pushed to the storeroom where they are positioned on either side next to a gravity roller conveyor which feeds the machine and assembly lines. This makes the storeroom more actively an integral part of the production department.

This installation eliminates unnecessary material handling around the storeroom area and at the start of all operations.

But in the main part of the plant, containing the assembly and machining lines, the analysis revealed that, if increased production was to be had and highly precise operations were to remain, something had to be done about job improvement. If the time spent in search, in handling and in positioning parts and assemblies, and in waiting for material to be brought to machines could be minimized, there would be a definite job improvement, and more time for production effort. Also the heavy lifting which produced fatigue became doubly important because of the dwindling supply of male help.

Setting the Pace

One more step was now the subject matter for speculation and discussion. Having improved the job, was it possible to *set a pace for precision work?* The old system of scheduling by lots had been unsatisfactory. In the larger sense, it did not give each worker a definite *task.* The difference between a *task* and *no task* could possibly be taken advantage of to increase production. This difference between a *task* and *no task* has been known in some plants to run as high as 40%. By making the worker conscious that he has a job to do—by giving him a task—increased production could be gained. Obviously the operator would not go about the plant looking for work to do (although in some cases he has) or if sufficient work were not immediately available at his station he would be inclined to prorate his efforts accordingly.

It was decided to set a pace commensurate with the turning out of quality work. This pace could be

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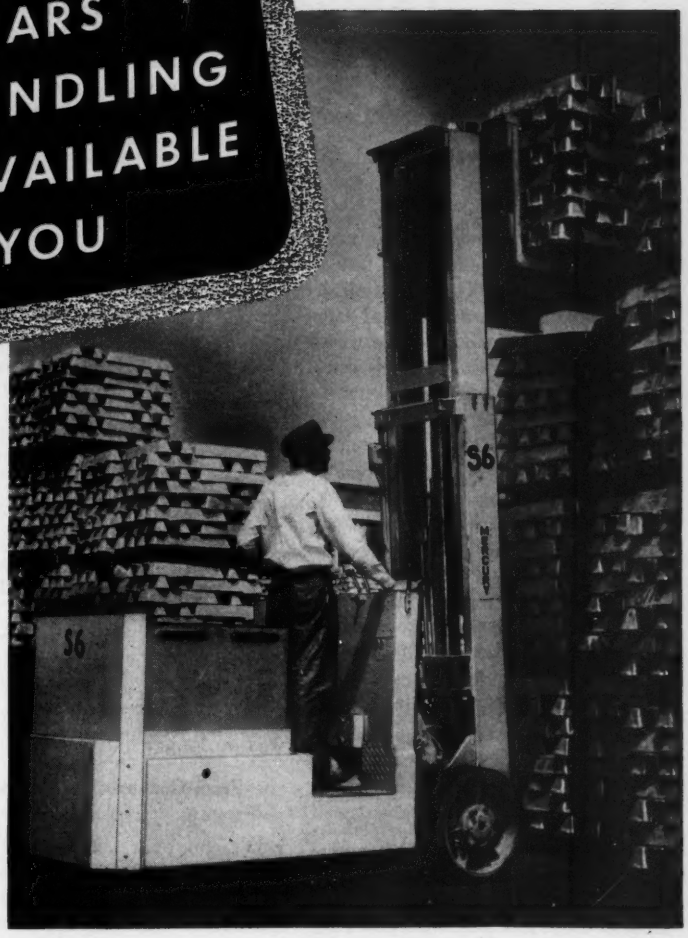

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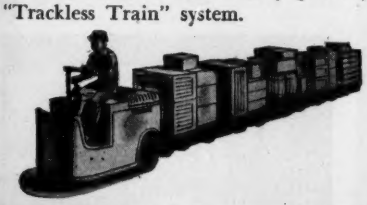
By way of illustration, the following are but a few of the important contributions Mercury has made to the materials handling field:

1. Originators of the "Trackless Train" system of materials handling. The fact that thousands of Mercury tractors and many times that number of Mercury trailers are serving throughout industry is evidence of the popularity of the "Trackless Train" system.



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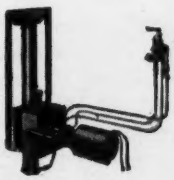
2. Mercury has pioneered and perfected many important industrial truck features. Those illustrated are standard on all Mercury fork trucks. While these features vary slightly on Mercury platform trucks, the basic principles are the same—

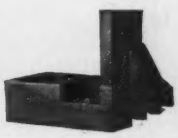


Hydraulic Hoist: No power required to lower load, no power wasted in lifting. Less than 50% of the usual moving parts.

Snap-action cam operated controller: Eliminates injurious arcing. Reduces maintenance to the minimum.

Unit constructed drive assembly: Motor and drive are one unit. Double reduction spiral bevel and spur gears transmit maximum power.

All welded frame: No rivets to weaken sections. Exterior is smooth and pleasing in appearance.



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XUM

maintained by having a task always available at the worker's station. The precision work precluded a live conveyor—nothing was to be done to "hurry" the operators. The answer was found in a gravity roller conveyor.

Automatic Supervisor

Under the old method of scheduling by lots and the use of trucks, the allocation of tasks to the individual workers depended too much upon supervision. Too much time was spent in supervision and the staff of supervisory employees were so absorbed with minor details that effective supervision was impossible.

How to make this mechanical handling equipment not only set a pace, but also be an automatic task allocator and thus an *automatic supervisor*, also entered into the plan for remedy.

The control whereby, under the old method, work was scheduled in lots obviously needed a change. It was decided if the gravity roller conveyor could be kept fully loaded with the day's work it would be possible to schedule an entire day's production. This would reduce paper work since it would no longer be necessary to keep track of work by lots, and all that would be necessary would be a simple "follower" ticket which would follow the five parts for each crankshaft assembly through the shop. This was kept in a pouch.

Mechanically Speaking

Hoists have a 500-lb. capacity and are closely connected to ball bearing monorail trolleys. Each hoist is operated on an individual ball bearing crane. This arrangement gives each operator his own unit and permits covering all floor space in that operator's section. All this equipment is anti-friction bearing equipped, thus permitting all movements with a minimum of effort and maximum efficiency and accuracy.

The control is by means of pendant rope. This permits the operator to lift or lower the load with one hand and guide the work into place with the other.

After the installation of the gravity roller conveyors, the program was to load the conveyors with a day's work. This was done at the storeroom. Here was the start of the roller conveyor which circled the shop. As parts for the complete crankshaft assembly leave the storeroom via the gravity roller conveyor, they are taken off and washed and then assembled on a torque machine with two counterweights. Immediately the five pieces in the assembly have a number stamped on them so that the same five pieces will end up in the final assembly.

A specially designed cradle that rides the roller bed carries this assembly into the production lines. Another is placed immediately alongside. The feed is constant, and as the work circles through the shop there is always ahead of the machine operator a definite task to do. The pace has been set.

Keeping the assemblies in rotation on the bed of the conveyor eliminated search. Keeping the conveyor loaded eliminated much of supervision. In a bird's eye view the supervisor could see gaps and detect operational trouble at once. All work could be pushed in cradles along the conveyor from work station to work station with but little effort. There was now no heavy hauling or pushing. Floor space was no longer cluttered up.

From Conveyor to Machines

This installation of a gravity roller conveyor proved to be ideal in getting parts to the work stations themselves. There remained now a problem of getting the pieces from the conveyor to the machines, then back to the conveyor, without heavy lifting and picking or scratching.

Overhead electric hoists and tramways (see picture) proved to be the answer. Now no heavy lifting was necessary. Female employees could do the work. The hoists were so sensitive that in positioning pieces could be lowered a fraction of an inch at a time, thus holding to a minimum the possibility of nicks and scratches.

"As a result of the above installations, plant No. 4 of the Ohio Crankshaft Co. can handle all the precision work that the other three plants can give them," states Mr. E. C. Sullivan, plant engineer and superintendent of production. "These hoists have been in use for three years and we have yet to repair one of them. Our maintenance problem as far as it concerns this installation just hasn't been one."

HOW WOULD YOU HANDLE IT?

THE problem here was to ship certain light and medium weight, well packed goods, such as soap powder, toilet paper, canned provisions, etc., long distances by rail in unit loads. The goods were to be handled mechanically without the addition of any appreciable dunnage weight.

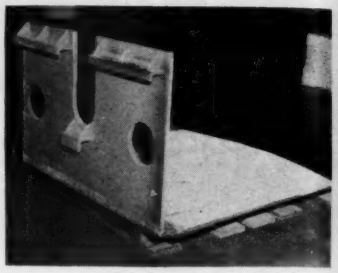


Figure 1.

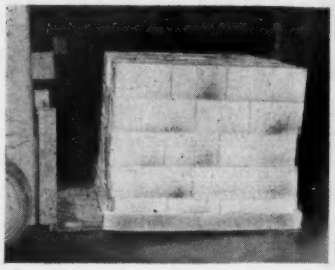


Figure 2.

The attempt to handle and tier these unit loads in freight cars, leaving a standard pallet at the depot for handling and storage by means of fork trucks with special chisel plates, failed to produce satisfactory results. As shown in Figure 1, in a Navy experiment on the problem a 42" x 42" chisel plate (made from ¾" high carbon steel, which was tapered from the back by milling down to ⅛" at the front edge) was used in conjunction with a sheet of fibreboard

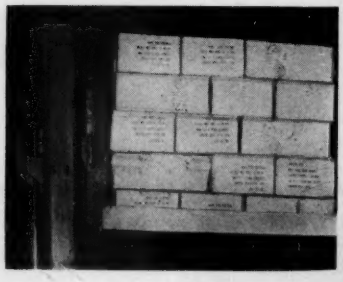


Figure 3.

serving as a securing base and as an aid to entry and withdrawal of the chisel plate, Figure 2.

A glued unit load of provi-

Figure 4.

sions, which weighed approximately 1770 lbs., caused a sag of about 2" in the plate, Figure 3. And, furthermore, the plate would not carry two loads without too much forward tilt. Figure 4. Also, when the chisel plate was placed in the second tier,

Figure 5.

upon withdrawal the upper pallet load was unavoidably pulled with it, Figure 5.

The Navy's problem was the difficulty in precisely spotting and picking up unit loads in railroad box cars and placing them on pallets for tiering in storage and rapid handling. If you are a user of chisel plate fork in similar operations, you may have some suggestions which will be of value to other people faced with this type of problem.

ARE YOU USING ALL OF YOUR SPACE?

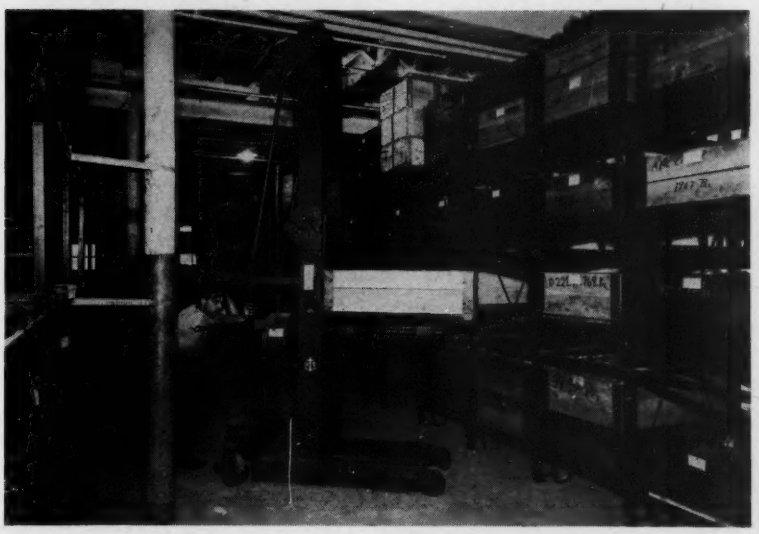
THE experience of the Henry Valve Company, Chicago, may point the way for other smaller plants facing problems of space shortage. The experience of this manufacturer of valves for refrigeration and air conditioning indicates that it may not be necessary to build an addition to the plant (a costly undertaking particularly today) when full use of cubic space is made in the stockroom.

Expanded business volume at the Henry Valve Company caused the storage area to overflow into the production department, which comprises about 40,000 square feet. Forgings and castings were stored on flat skids which were arranged on the floor. No facilities were available for stacking the loads high. At the same time, additional space for production was needed.

The interplant planning committee, long preoccupied with pressing production problems, then devoted its attention to materials handling operations in the stock room. The study made it clear that the congestion could be relieved, and the necessary space gained, by a racking system in conjunction with skid boxes and a mechanical stacking device. Since the products were loose (and many of them small) skid boxes with nesting sections would permit a comparatively large quantity to be piled in each unit. And a portable elevator could stack the loads high, conserving critically needed floor space.

When the racks had been installed and the loads taken up in the air, the whole installation took up only 300 sq. ft. as compared with the more than 3,000 sq. ft. that were used previously with on-the-floor storage. By means of a portable elevator, skid boxes weighing as much as 3,000 lbs. each are now stacked within a few inches of the ceiling.

The company was so well pleased with the vertical storage system that it soon after ordered another



How Henry Valve Co. saved hundreds of sq. ft. of floor space. Note special barrel, rack, left.

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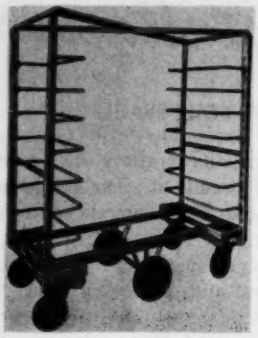

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rack for storage of metal drums containing certain types of pieces. The maximum weight of these drums is approximately 1,500 lbs. each.

Since the rack sections for drums are narrower than those used for the skid boxes, the portable elevator had to be equipped with a specially narrow lifting platform. Yet a standard platform was necessary for placing the skid loads in and out of storage. The problem was solved with an elevator that is equipped with a narrow platform over which a platform of standard width is clamped. The latter is simply slipped off when the elevator is used for handling barrels in or out of the rack. Thus both needs were met with the same piece of equipment.

A simple and clever method was devised by the company for transferring barrels from hand trucks to the platform of the portable elevator. For this purpose an inclined wooden ramp was constructed with a hollow in the upper end. This ramp is placed against the elevator platform as shown in one of the photos. When the loaded truck is run on the ramp and the wheels hit the hollow, the barrel breaks forward and is then easily pushed on the elevator platform for placement in the rack. The transfer from the platform to the hand truck is accomplished similarly.

Photo on preceding page shows portable elevator being used with standard width platform for handling skid boxes. Above, this platform has been removed to allow narrower platform to enter section of rack on which barrels are stored. Wider platform is quickly clamped on or off, according to requirements.

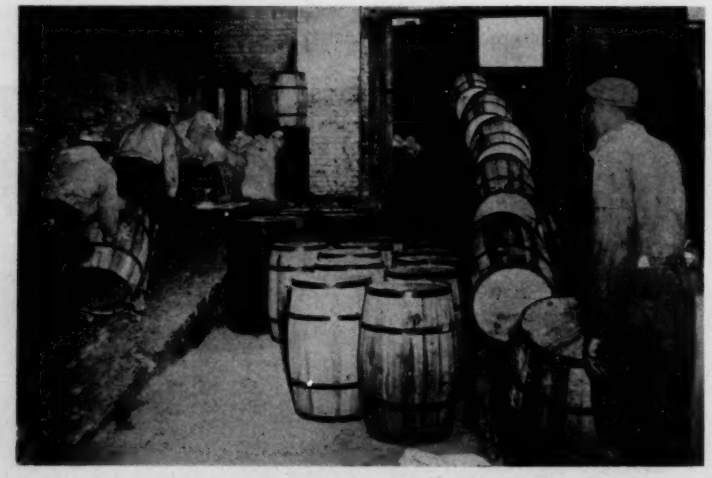
With a systematic stockroom procedure made possible by the rack system, the company has noted several distinct advantages.

Ramp aids transfer of barrels to platform.

The saving of at least 2,700 square feet of floor space was only one of these. The orderly, vertical storage of loads has made possible instantaneous location and selection of raw stock to go to production. Handling of loads has been reduced by at least 50%. This is explained by the fact that, with on-the-floor storage, it was often necessary to

OUT WITH THE OLD, BRING IN THE NEW

HERE'S a revealing photograph of the old and the new way of handling barrels on ramps. At the left, 225-lb. barrels of soap chips are being pushed and pulled up a 20-ft. concrete ramp by two men. To the right is the new method of loading a truck with the filled barrels. This powered belt conveyor is permanently installed at a degree of pitch which accommodates the loading and unloading of the barrels directly into trucks. Guard rails prevent the barrels from rolling off. Although this installation does not represent a recommended use of this equipment, it does illustrate one adaptation of a standard unit in meeting a special handling problem.—*Courtesy, The Rapids-Standard Co.*



move a considerable number of skids before the desired one could be reached.

The space gained was used for a new drill press department, an inspection department and a new laboratory. Too, since the stock is now concentrated in a specific, compact area, better housekeeping and neatness of appearance have resulted.

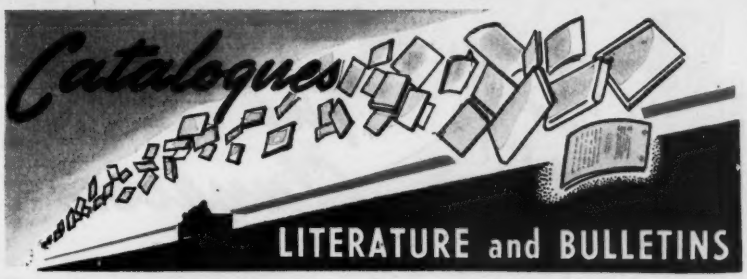
This handy platform was made to give workers solid footing. For easy moving about between locations, two front legs are caster mounted, rear ones have handles on sides.

At the same time, inventory control and the taking of inventory have been facilitated considerably. The part number and the number of pieces in each load are indicated on the sides of the skids. When inventory is taken the operator merely reads off the numbers indicated. And with the skids stacked high, the possibility of wrong handling through removal of individual pieces is virtually eliminated.

If you are faced with a similar problem, cubic use of space may give you the extra square feet of floor space needed, plus better operating conditions.

PALLET IDENTIFICATION

HERE is how time is saved by one company in selecting pallets of the proper size and type. A simple color code is used for this purpose. To make the markings visible from all four corners, the colors are painted on diagonally opposite corners. While yellow might identify a regular 48"x48" pallet, a combination of yellow and black might be used for four-way entry pallets of the same size. In this way all pallets are properly identified, permitting ready selection without loss of time.



The publications featured on these pages were written by experts. They are FREE publications. To obtain these write to FLOW MAGAZINE, 812 HURON ROAD, Cleveland, 15, Ohio.

30—Gravity Conveyors . . . 16 pages of data and photos of applications of gravity conveyors and accessories, by The Rapids-Standard Co.

31—Industrial Logistics . . . A management booklet on planned systems of materials transportation covering correct containers, palletizing and cost analysis criteria. An Elwell-Parker Electric Company presentation.

32—The Palletized Load . . . Simplified packaging—a new development and a new program for shipping. The Navy program of palletization and its application to industry is discussed. A Robert Gair Company publication.

33—Designed for Lifting . . . A four-page folder describing oil-hydraulic elevators for shipping platforms in plant installations. Engineering data are included. From The Rotary Lift Company.

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11-45

ROLLING ON THE MONORAIL

BRINGING the welding machines to the work, as shown in this photo, has eliminated many heavy handling operations in the jeep body line at the American Central Corporation, Connersville, Indiana. (This line is now making jeep bodies for civilian use.) With the machines kept mobile on the overhead monorail trolleys, numerous welding operations can be performed without handling the heavy jeep bodies.

The Flow Classroom

WHAT EVERY FORK TRUCK OPERATOR SHOULD KNOW
(Part II)

THE previous lesson was on the problem of teaching beginners how to use fork trucks. This one is a more advanced course for those operators who already have had the previous instructions. For this, actual pallet loads are used.

In the beginning of this lesson, the instructor lifts a pallet load with a fork truck, placing it on a right angle drawn on the floor after making a turn around the room. Each operator is then allowed to place this load. One swing is all the maneuvering permitted.

Extra backing and shifting causes the greatest loss of time in fork truck operation. If we start from the beginning, training these people to use only one swing at the stack and training their eyes to make one swing, we will eliminate one of the greatest time losers in fork truck operation.

It has been found that by following the path of the drive wheel on the inside of the turn, with the eye, it is very easy to spot the load without any loss of space. As the center of pivot of the machine lies on the line formed by the drive axle, it is obvious that the drive wheels are the key to the actual spotting of the load. After three or four turns apiece, each student should be able to spot the load on the square or right angle with two inches or less of lost space.

Spotting Loads

The second part of Lesson I consists of spotting a pallet load adjacent to another. This also must be performed by one swing of the machine. The fork truck approaches the stock pile (pallet load on floor) by crossing in front of the stock pile rather than by approaching from the opposite side towards the stock pile. If the stock pile is approached from the opposite side, the pallet load will move away from the stock pile when the fork is turned to set the load down, leaving as much as six (6) inches lost space.

By crossing in front of the stock pile when the load is moved into place, it will travel toward the stock pile with no loss of space. In this position the fork truck is turning to straighten out the load. When the fork truck turns, the rear end will move to the right and the load to the left, and the load will be spotted directly in line with the stock pile with no loss of space.

Tiering

The next problem is the lesson on training of operators to tier first one pallet load upon the other and then placing a double pallet load on top of that with an error of no more than two inches in any direction. The technique of approaching the stack on the proper turn is the same as used in the beginning of this article in spotting the pallet load on a square on the floor; however, in this case, while driving, the load must be raised and in position by the time the stack is reached.

Motor Control

This brings us to a very important phase of fork truck operation. In the operation of a gasoline machine, when leaving with a pallet load, the machine should be brought to maximum speed as rapidly as possible and held at maximum speed until a reasonable distance from the destination. The clutch is disengaged and the machine coasts toward the stack, slowing down. The motor should be racing with the load rising. By the time the stack is reached, the load will be in position and without using the clutch again, the machine

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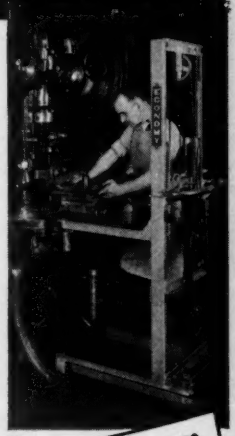

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will carry its load with its own momentum to the stack. The load will be deposited and the machine backed away.

This eliminates any excessive clutch wear which might be prevalent in operation of gasoline fork trucks. (Clutches are worn out by the constant inching which is required if the fork truck is allowed to stop before the pile is reached. Inching also slows down the operation because there is brought into play another operation, i.e., the engagement of the clutch.) If the machine coasts to the stack, all attention may be given to spotting the load. This is important and must be impressed upon each prospective operator before he qualifies. Inching with the clutch must not be tolerated.

Tiering Double Pallet Load

The next lesson is to teach the operator the job of tiering a double pallet load adjacent to stock pile. This must be done with one swing of the truck with an error of not more than two inches in any direction. In carrying a high load such as this, all traveling should be done in reverse so the operator has unobstructed view to the rear. As the fork truck has the same speed in reverse as it does forward, there is no difference as far as the machine is concerned as to which direction the traveling is done. This will speed up the operation considerably because in traveling with a high load in the forward direction, the operator must proceed very slowly to avoid collisions.

In this case also, the stack must be approached from the same side as the stock pile; in other words, the stock pile must be crossed as in the previous lesson for the same reason, i.e., when the load is straightened or squared off, it will move toward the stock pile rather than away, eliminating any lost space between the pallet loads.

Aisle Practice

By this time the operator is in an advanced class and can now be taught under as nearly as possible, warehouse conditions of aisles. The pallet loads are laid out to form an aisle of fourteen (14') feet to start.

In the previous lessons, there was no limit as to the radius of turn the operators were permitted to use, allowing them to get the feel of the machine and to accustom their eyes to the travel of the machine.

At first, the fourteen-foot aisle is set up. This may be changed to twelve feet, as the operators progress. The instructor should keep foremost in his mind throughout all of these lessons that the stock pile is approached, coasting, with the clutch disengaged, never under power. The operators must practice constantly, co-ordinating their movements so that the stock may be approached, coasting, with the load rising, then depositing the load without having to use power for inching to the stack. This cannot be overemphasized.

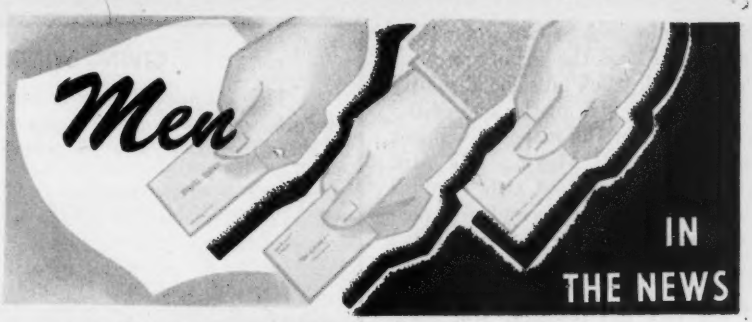
In the case of electric machines, this is also true (although most electric machines have separate lift motors so that coordination of these movements is not quite so difficult).

Another training maneuver should now be introduced. The operator must pass between two pallets with one half inch to spare on either side without stopping. The first three or four times more clearance should be allowed—perhaps two inches on either side, the two pallets being moved in gradually.

The reason for this exercise is to train the operators to be able to spot pallet loads in a bay which is one pallet load wide, without stopping. This condition is found in nearly all warehouses.

At this point the operator should practice passing through an aisle one pallet load in width from a fourteen-foot warehouse aisle. This is an elaboration of the first part of these lessons and should not be difficult.

This is, perhaps, the most exacting type of work a fork truck operator will be called upon to perform. The space to be passed through be-



APPOINTED Atlanta representative of the Storage Battery Division of Philco Corporation, *Charles F. Greene.* Mr. Greene was formerly connected with A. K. Sutton, Inc., Philco distributors in North Carolina.

APPOINTED sales manager of Pacific Engineering Corporation, Los Angeles, *H. Y. Satterlee.* Mr. Satterlee was recently in the sales department of Edo Aircraft Corporation.

APPOINTED sales manager, Power Transmission Machinery Division of Link-Belt Company, *A. C. Fellinger.* Mr. Fellinger will headquarter at the company's Indianapolis plant. He has been with the Link-Belt organization in Indianapolis since 1916 and before that was manager of sales through distributors with headquarters in the company's Chicago office.

Silent chain drives sales of the company will be headed up by *H. F. R. Weber,* with headquarters in Indianapolis. Mr. Weber started his Link-Belt career at the company's Philadelphia plant in 1915.

APPOINTED to the newly created position of assistant to the general sales manager of R. G. LeTourneau, Inc., Peoria, Illinois, *Walter N. Fischer.* Mr. Fischer formerly was associated with Schramm, Inc.

ing only an inch or two wider than the pallet load, the line of approach of the fork truck must be absolutely perpendicular to the line of the stock pile, or the machine will not pass through. Making this turn from a fourteen-foot aisle requires considerable practice and the operator should be able to do this without a miss before being passed to the next series of trials.

In this the operator will back through an aisle between two pallet loads with one half (½") inch clearance. This, of course, is difficult. This condition will be found in warehouses when breaking out from a bay which is one pallet load wide.

As the fork truck is traveling backward, the operator has to give attention to both the rear of the machine and the pallet load, which are on opposite sides of the operator. This is done successfully by starting through the space looking backward, then as the pallet approaches the space, the operator turns his attention to the left hand side of the pallet, bringing it as close as possible to the side of the aisle space, using minimum clearance. In this way, he knows that the other side will clear.

By way of a final exam, a spot in the warehouse is chosen which is as near as possible to standard conditions, and the operator will tier and untier a set of pallet loads according to the rules learned.

GIVING WINGS TO THE MAILS

This individual tractor has just hauled 8,700 lbs. of mail for loading on the huge overseas plane at La Guardia airport, New York City. The bags are transferred to the pallet which the fork

lift truck elevates to the airplane hatch for loading. Tractors like these perform many types of airport work, including the pushing and towing of planes on the aprons, inching them in and out of hangars, as well as hauling baggage, food and supplies.—Courtesy, W. F. Hebard Company.

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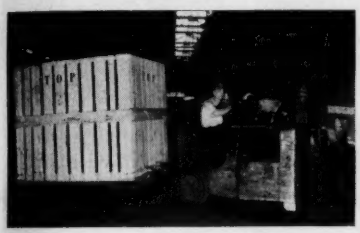
(Continued from page 35)

and checking, is performed in the same manner as in the case of the eastbound freight.

The billing for shipments loaded by stowing gangs is assembled at each loading car or truck. It is picked up at regular intervals by platform supervisors and delivered to the foreman's office. Here the billing is tonnaged, routed and passed to the billing department via the pneumatic tube system.

Nimble Handling

The tractor operators usually arrange the trailers in trains of not more than 10 trailers each. These trains move with surprising agility even through the most crowded areas during the rush periods. For example, three parallel trains may already be moving on one of the 40-ft. wide unloading platforms, but the driver of a fourth train will skilfully maneuver the long line of snaking trailers behind him through



Low-wheel dolly used for moving machinery.

the narrow space left. Since speed is of the essence of modern l. c. l. movement, the compact, sturdy tractors are well suited to fill the need for the mass-movement of goods in minimum time from inbound to outbound locations.

The transfer of long, heavy and bulky pieces shipped in open-top cars—steel and machinery—is performed on a special platform at the west end of the freight house. This platform is served by a gautry crane of 10-ton capacity. Both slings and a magnet are used for unloading purposes.

While pieces of machinery arriving in closed cars are hauled by means of special dollies at present, a number of fork lift trucks will soon be added to the fleet in order to facilitate the handling of these heavy items within the freight house.

Special Facilities

A "perishable" loading schedule is maintained during all seasons of the year to accommodate the movement of l. c. l.perishable shipments. (An independently owned ice plant is operated in the south yard—one of a number of special service facilities.) A platform extending from the east end of the freight house between tracks 7 and 8 is used for assembling and preparing ice required in the perishable units, also for servicing car heaters. Protection against heat and cold is furnished under this schedule to principal points on C & NW lines reached by a 24 to 48-hour delivery schedule.

Maintaining the Momentum

The method of pay of the 500 freight handlers contributes considerably to the fast movement of the freight through the station. The men are paid on the basis of tonnage handled, not by the hour or week. Earnings of check and stowing gangs are based on the daily tonnage production of each individual gang at the particular rate per ton for each class of labor in the unit. (A daily minimum wage is guaranteed.) This "bonus" or "premium" method of compensation has proved most satisfactory. It makes possible minimum supervision, for every worker is practically his own supervisor—each one is interested in moving the greatest possible tonnage during every working hour. The greater the worker's effort, the greater the amount in the pay envelope.

Thus the method of compensation is a direct aid in operating the tractor-trailer system at maximum capacity in this great freight house. And with plant layout and materials handling procedures perfectly coordinated, the C & NW is enabled by means of the tractor-trailer system to move a volume tonnage of l. c. l. freight on an exceptionally fast schedule.

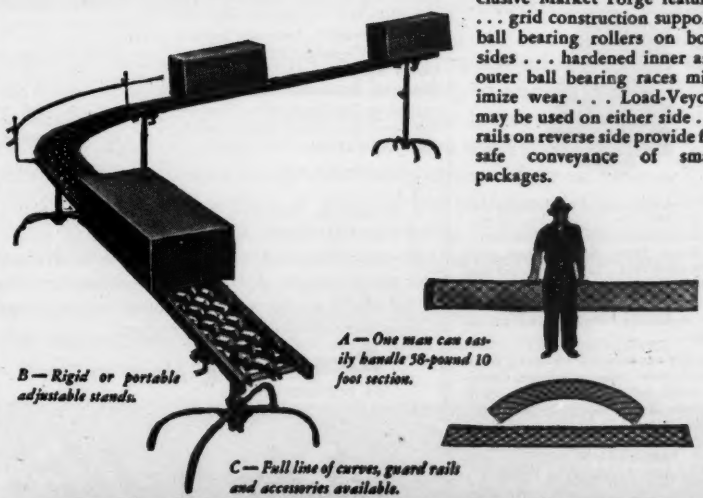
(FLOW acknowledges with thanks the help given in the preparation of this article by the Proviso Freight Station's Chief Clerk William Nehring.)

STANDARDIZED
MATERIALS HANDLING EQUIPMENT

LOAD-VEYORS
SEND FOR LOAD-VEYOR MANUAL No. 1004MH

A MAGIC CARPET FOR INDUSTRY

Load-Veyors combine great strength and light weight. Exclusive Market Forge features . . . grid construction supports ball bearing rollers on both sides . . . hardened inner and outer ball bearing races minimize wear . . . Load-Veyors may be used on either side . . . rails on reverse side provide for safe conveyance of small packages.



B — Rigid or portable adjustable stands.

A — One man can easily handle 58-pound 10 foot section.

C — Full line of curves, guard rails and accessories available.

MARKET FORGE COMPANY, 60 GARVEY ST., EVERETT 49, MASS.

Save Time... Effort... Space... and Money

Item NS-506

Combination

Truck and Drain Rack

Loads Automatically

As truck is tilted against drum, steel fingers grip the flange at top. Loading is completed as truck is rocked back to wheeling position. Free-rolling wheels make light work of trucking the heaviest drums. Slight downward push on handles lays truck on floor with wheels raised free, thus providing convenient draining position. Heavy angle iron frame, tubular handles, all welded construction. Two 8″ roller bearing wheels. Weight 90 lbs.

Detachable Handles. When used as drain or storage rack, handles can be detached. Thus conserving floor space and permitting one pair of handles to serve any number of trucks.

Item NS-506 $42.50
(Handles welded to frame)

Item NS-506-DH $44.50
(Truck and detachable handles)

Item NS-506-R $32.50
(Item NS-506-DH without handles)

Item NS-506-H $12.00
(Detachable handles only)

Barrel Truck

Handles with ease barrels weighing up to 1,000 lbs. Weighs but 85 lbs. To load, shove truck up against barrel or drum, then drop sliding steel catch over rim . . . pull toward you and truck loads automatically without rocking or tugging—loads from row as easily as when barrel stands alone.

Sturdily constructed of heavy steel, two 10″ roller bearing wheels. Greatest width only 22″, permitting it to pass through aisles and doors too narrow for many trucks.

Item S-911-M $33.50
Equipped with metal wheels

Item S-911-R $38.50
Equipped with molded-on rubber wheels

Item S-703 $14.75

Industrial Dust Pan

No shovel to bother with. Moves around in places too tight for a wheel-barrow. Very light to handle. Weighs only 45 lbs. Capacity one bushel. Exceptionally well constructed to withstand rough treatment in industrial plants.

The pan or metal basket which measures 18″ x 18″ x 18′ is made of 16 gauge sheet steel, the frame of 1″ x 1½″ x ⅛″ angle iron, the handle of 1″ tubing, all welded construction. The overall height is 48″. Two 8″ rubber tired, ball bearing wheels.

Item NS-364
Price $150.00
Complete as shown

Sheet Steel Grab

For handling sheet steel in bundles of any size lift up to 9″ thick, 18″ to 48″ wide, and any length. "Grabs" can be used single, double or triple according to size of bundle; cut shows triple application. Capacity, one ton per "grab"—total, 3 tons. Holds sheets securely without slippage, distortion or damage to stock. Suited to high or low head room. Supporting beam measures 6′ long. Heavily constructed. Weight, 190 lbs.

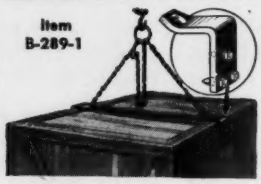
Item B-339-A $25.00
Plain bearing metal wheels

Item B-339-B $27.50
Roller bearing metal wheels

Item B-339-C $32.50
Rubber tired roller bearing wheels

Shovel Truck

For pick-up and moving barrels, hampers or cases; sturdily constructed and easy wheeling. Overall height 48″. Heavy steel nose plate, 19″ wide at base, 13″ wide at front. All welded construction. Two 6″ diameter wheels. Convenient shaped handles of heavy 1¼″ O.D. tubing. Weight 50 lbs.



Item B-289-1

Spike Type Box Grab

For grabbing and lifting large, heavy boxes where the use of spiked grips is allowed. Gripper plates are fitted with replaceable cone-headed spike bolts. Model shown has 1000-lb. capacity; can be used on boxes up to 5 feet wide. Larger models are built proportionately heavier. Four sizes:

Item B-289-1 Cap. 1000 lbs. $37.50

Item B-289-2 Cap. 2000 lbs. $52.75

Item B-289-3 Cap. 3000 lbs. $68.25

Item B-289-4 Cap. 4000 lbs. $95.00

Item NS-298
$46.50

Hand Dump Truck

Constructed of heavy sheet steel, reinforced with band at top edge, stout ⅝″ round rod iron handle welded to truck. This truck measures 25¾″ by 45″ at the top and 25¾″ by 27″ at the bottom by 17½″ deep—carries about ½ cu. yd. and weighs 125 lbs. Equipped with two 8″ semi-steel wheels and two 4″ metal swivel casters. Weight 125 lbs.

Item B-205
$12.50

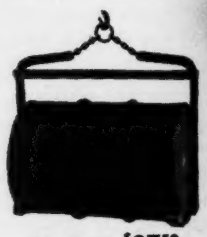
Drum and Barrel Sling

Used for loading and unloading truck, and for general purpose handling. Handy for draining drums. Can pick up drum from laying position and set on end. Will handle drums, barrels, kegs—anything with a lip such as on steel drums or wooden barrels. Heavily welded chain, forged grab hooks. Capacity, 1000 lbs. Weight 8½ lbs.

Item NS-288
$55.25

Barrel and Box Grab

For picking up any type of wood or steel barrel, box or container, from 40″ diameter down to small nail keg size. Capacity, 1-ton. Weight 35 lbs.



Item B-416 $27.50

Barrel Cradle

Toggle Type

For picking up any shaped barrel or drum—straight or bilged sides, flat or chimed ends. Ideal for handling flush-end fiber or plywood drums. Also used for handling rolls of paper, carpeting, or other cylindrical packages. Capacity, 1000 lbs. Special sizes to order. Heavy bar stock, welded construction. Weight, 45 lbs.

Production economy is the purpose behind the P. S. line of materials handling equipment . . . for pick-up, loading, moving, dumping or storage . . . built of metal, or wood, or combination. Tell us your problems . . . our engineers will gladly recommend and quote on equipment fitted to your individual plant and product.

When ordering: Always use "Item" number to prevent error.
All prices f.o.b. Detroit.

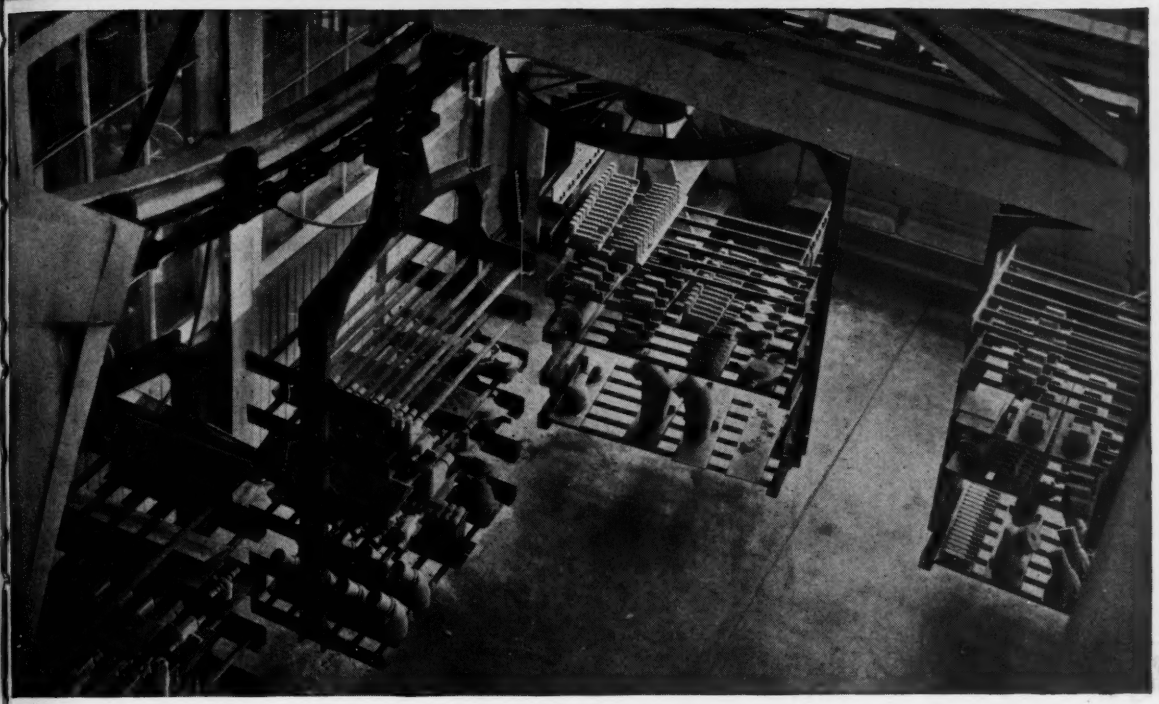
Palmer-Shile Co.
7170 West Jefferson Ave., DETROIT 17, MICH.

NOTE: Weights given are in all cases approximate.

Mathews

TROLLEY CONVEYERS

Engineered to serve Production



Trolley Conveyers are being applied in modern foundries for handling materials, usually cores and castings, through Production Departments, from one building to another, and in many other ways are operating to serve production. Transverse bends lower the loads to working height, keeping a continuous flow of materials reaching the working area. The conveyers do their work without occupying valuable floor and aisle space. They can serve one or several floor levels, and can be applied inside or outside the buildings. Variable speed drives make possible the exact control of the material reaching the working areas and the many types of hangers available add to the flexibility of the conveyers. Mathews Trolley Conveyers, like other prominent Mathews types for foundry application, are on the job today in many of the nation's great foundries. A Mathews Engineer operates in your vicinity, and would appreciate an opportunity to help you with that conveying problem.

Mathews Conveyer Company

ELLWOOD CITY, PENNSYLVANIA

XUM

HANDLING + Processing + HANDLING + Assembling + HANDLING + Packing + HANDLING + Storage + HANDLING

HANDLING—the Common Denominator of PRODUCTION

LET MEN DIRECT POWER—NOT GENERATE IT!

Human effort increases in direct proportion to size and weight of loads moved by hand. With mechanical handling, no extra manpower is needed as loads get bigger. One man directing power equipment, can, for example, move four times as much, faster and more easily.

Towmotor, capable of moving, lifting and stacking large, heavy loads, increases manpower capacity, thereby effecting savings in time, money and labor. The Towmotor DATA FILE tells the complete story. Send for your copy today.

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